DOLLARS

A Process Improvement Approach to Logistics Financial Management

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DOLLARS *and* SENSE

A Process Improvement Approach to
Logistics Financial Management

MR-1131-A

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Prepared for the United States Army

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PREFACE

In applying Velocity Management (VM) to improve such key logistics processes as order and ship, repair, and stockage determination, the Army has uncovered anecdotal evidence that some delays and errors in these processes can be traced to the performance of the logistics financial management process. Improvements to the speed and accuracy of basic logistics processes should not be hampered by a financial management system that is slow and inaccurate, that creates errors and delays, and that places obstacles in the path of efficiency and effectiveness. Recognizing the need to improve the performance of the logistics financial management process, the Velocity Group (VG) formed a Financial Management Process Improvement Team (FM PIT). This report documents analysis conducted in support of the FM PIT. Following the VM methodology of Define-Measure-Improve (D-M-I), the research to date has focused on defining the process, conducting exploratory measurements to test the utility of some candidate metrics, and suggesting improvements to financial management processes.

A second RAND report by Ellen M. Pint et al., *Right Price, Fair Credit: Criteria to Improve Incentives for Army Logistics Decisions* (forthcoming), documents research on improving financial incentives to use resources wisely. It develops criteria for evaluating financial policies and draws implications for financial management policy.

The research documented here is being conducted in the Military Logistics Program of the RAND Arroyo Center under the direction of John Dumond. The Arroyo Center is a federally funded research and development center sponsored by the United States Army. The

Deputy Chief of Staff for Logistics, U.S. Army, sponsored the research. The research should be of interest to logisticians and financial management personnel in all the military departments and the Office of the Secretary of Defense, especially those concerned with the services' working capital funds and the pricing of their goods and services.

Related logistics research is documented in other RAND publications listed in the bibliography. Readers interested in RAND publications listed there should contact RAND Distribution Services, 310/451-7002 [voice], 310/452-6915 [fax], or e-mail at order@rand.org.

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SUMMARY

> There will not be a revolution in military affairs unless there is a revolution in logistics. This means putting our faith in concepts like *velocity management* and total asset visibility, giving up the comfort of stockpiling supplies on an iron mountain.[1]

INTRODUCTION

In 1992, the Department of Defense began requiring the services to procure and repair all depot-level reparables (DLRs) through their stock funds. As a result, customers of the Army stock fund began paying for DLRs, which were previously financed through procurement appropriations and issued free to customers, based on their stated need. Customers also began receiving credits for DLRs returned to the stock fund. On a DoD-wide basis, implementing the requirement that DLRs be stock funded reduced the demand for DLRs and increased the return of unserviceable assets for repair. From the DoD/Army perspective, working capital funding has resulted in significant reductions in materiel costs and civilian personnel. While expenditures by logistics customers have been reduced, senior Army logistics managers have become concerned that the current implementation may not be cost-effective when evaluated from an Army-wide perspective. A wide range of behaviors have changed as a result of the incentives created by the implementation policies. As a result, there is a need to examine logistics financial management in a more rigorous, analytical manner.

[1]GEN Dennis Reimer, Army Chief of Staff, *Army Magazine*, October 1998. Emphasis added.

To this end, the Army decided to apply its Velocity Management (VM) approach to the logistics financial management system. Begun in 1995, VM has achieved impressive success in improving the performance of key Army logistics processes. As a result, the Army established a Financial Management Process Improvement Team (FM PIT). The initial focus of the FM PIT has been on financial management processes that occur on the Army's active-component installations, from the company level through the interface between the operating units or activities, which are funded by Operations and Maintenance Army (OMA) appropriations and the supporting installation's Retail Stock Fund (RSF) component of the Army Working Capital Fund (AWCF).[2]

DEFINING THE FINANCIAL MANAGEMENT PROCESS

Following the VM Define-Measure-Improve (D-M-I) process improvement method, the financial management PIT began by developing a detailed common understanding of the financial management process at the installation level, focusing on detailed "walkthroughs" that mapped the financial management process from the perspective of the unit commander as customer. The mapping process identified three interrelated components: (1) the logistics information system; (2) the financial information system; and (3) the system of financial checks that are imposed on logistics purchases.

In addition to the series of maps capturing the overall retail-level financial management process associated with supply transactions, the FM PIT also produced a set of more specific maps of other financial management processes, including the following: the process for using the Integrated Logistics Analysis Program (ILAP) tool for integrating logistics and financial information; the end-of-year financial process—a period in which financial managers operate under even tighter fiscal control; the credit flow process; and the

[2]In future work, the D-M-I methodology should be applied to financial management processes in the AWCF's Supply Management and Depot Maintenance activities.

Army's monthly process for producing and distributing the logistics supply catalog.[3]

A review of all the process maps made it very clear that financial and logistical reconciliation of both prices and credits is a time-consuming, manual process. Funds availability requires units and the division comptroller to reconcile logistical and financial transactions periodically. It is often difficult for the unit to track its commitments, obligations, and credits. Therefore, units must maintain an informal ledger to estimate the availability of funds and to exercise decentralized fund control—a problem that suggests clear areas for process measurement.

MEASURING THE FINANCIAL MANAGEMENT PROCESS

Under the D-M-I method, after a process has been defined and understood, the next step is to measure the performance of the existing process—how it actually functions. VM emphasizes measurement along three dimensions: time, quality, and cost. Based on the analysis from the define stage and on data availability, the FM PIT identified three initial metrics to monitor: (1) the quality of price information; (2) the quality of credit information; and (3) the financial wait time (FWT), defined as the time it takes for a supply transaction to be closed out in the financial system.

Quality of Price Information

During the FM PIT's process walks at Fort Campbell and other Army installations, PIT members noted that clerks needed to go through an elaborate manual process to reconcile the prices in their supply records with those in their financial records. Because price is not part of the requisition information passed through the logistics and financial processes (and because of the very long process flow times), prices can differ at the time of obligation, receipt, and interfund billing. Analysis of various sources of data and information revealed that price changes occur throughout the year, although financial

[3]This catalog is called the Federal Logistics Catalog (FEDLOG). It contains separate catalogs for each of the services. The Army portion of the catalog is called the Army Master Data File (AMDF).

policies indicate that they should change only once a year. Thus, the price the customer ultimately paid could be significantly different from what he expected to pay. There are a number of reasons for these price changes, but collectively they suggest a deficit in the quality of price information.

Quality of Credit Information

Examining the quality of credit information revealed two problems, one having to do with the variability in funds received for turn-ins of items and one having to do with the nature—or demographics—of what items are being turned in for credit. Analysis of the first problem showed that Army retail credit policies create substantial financial uncertainty for units, because a unit can never be certain of how much credit it will receive when it returns an item. Much of the uncertainty centers around the Army's policy of basing credit on the installation's net asset position (NAP) at the time the item is turned in.

Although our data analysis of the second problem does not further indict the quality of credit information, it is an issue worth addressing. Our analysis showed that the units were turning in vast numbers of low-value consumables for credit and that most returned parts were inexpensive—90 percent of the returns at Fort Campbell and 84 percent at Fort Hood had an original purchase price of less than $50. The value of these items to the Army may be less than the value of the time spent returning and restocking them.

Financial Wait Time (FWT)

This metric focused on the time it takes for a unit to see the effect of a supply transaction—either a requisition or a return—on its ledger. (Because prices can change, long FWT can exacerbate problems with the quality of price information.) Our analysis showed that there is a great deal of variability as well in FWT. We measured the time for each transaction from the date it was entered into the supply system to the date of the last record in the financial system. While the mean time of one aviation company at Fort Campbell was 29 days, the unit waited more than 111 days for the financial information for 5 percent of the requisitions and returns to appear in its financial records.

Such variability makes accurate tracking of ledger balances virtually impossible.

IMPROVING THE FINANCIAL MANAGEMENT PROCESS

Once the financial management process has been defined and measured, the next step is to identify and implement process changes or enablers to improve the process. Unfortunately, many financial management problems are the result of Army financial management policies that a single installation cannot change. Thus, recommended policy changes focus on those the Army can make, using examples from Fort Campbell to illustrate key points when appropriate.

In terms of improving the quality of price information, we recommend two policy changes that could help stabilize prices and reduce the amount of time unit personnel spend on their manual financial reconciliation process:

- Lock in the price at the time of request so that the price the customer pays is the price in the catalog at the time of request.
- Improve the catalog distribution process, changing Army supply systems so that all customers and suppliers access the same catalog for all transactions.

As for improving the quality of credit information, we recommend three actions:

- Link credit rates to Army-wide net asset position (NAP) to enable units to better monitor and forecast their spending relative to budget, to allow them to better adjust stockage levels of items on authorized stockage lists (ASLs) and prescribed load lists (PLLs), and to give them less incentive to delay turn-ins in the hope of receiving higher credit at a later time;
- Set dollar thresholds to improve the turn-in process for low-value items. This action would allow these items to be retained for future use or discarded at lower levels rather than turned in to the supply system—workload would be reduced throughout the retrograde process, and units would have fewer transactions to monitor in their financial ledgers.

- Use an exchange pricing system—much like what the Navy and Air Force already use for their DLRs—to stabilize credits and allow credits to reflect the costs of transportation, repair, and restocking at the wholesale level on an NSN-by-NSN basis.

Finally, to deal with problems identified with FWT, we recommend two actions:

- Reduce delays by setting dollar parameters to allow for review of very high dollar values while allowing most requisitions to be processed without delay.
- Encourage financial management personnel to use available financial management tools—like ILAP—to reconcile logistics system data with financial management data. In addition, locking in prices and stabilizing credits will reduce the uncertainty associated with financial delays, since units will know the financial impact of a requisition or a return at the time it occurs.

Many of the foregoing recommendations can be summarized in a basic principle that the Army should adopt: **The prices and credits in place when a transaction is first undertaken should be the prices and credits used for the transaction.**

FUTURE INVESTIGATION

As the Army and DoD move forward to modernize their legacy systems, they would do well to look to the leaders in industry for examples of successes and failures. The young soldier of today is accustomed to ordering books, music, computers, etc., quickly over the Internet. Up-to-the-minute financial information is available with the click of a mouse or the punch of a phone button. Stocks and bonds are traded electronically. The gap between corporate America's automation and the Army's is widening daily. The Army should move rapidly to commercial products that would revitalize its current logistics financial management systems.

ABBREVIATIONS AND ACRONYMS

ABF	Asset Balance File
ADP	Automated Data Processing
AFMIS	Army Food Management Information System
AMC	Army Materiel Command
AMDF	Army Master Data File
AN/ASN-86	Inertial Navigation Set, Model 86
APC	Account Processing Code
ARMYLOG	Army Logistics Catalog
ASA(FM&C)	Assistant Secretary of the Army (Financial Management and Comptroller)
ASL	Authorized Stockage List
AWCF	Army Working Capital Fund
BMO	Battalion Maintenance Officer
CASCOM	Combined Arms Support Command
CCSS	Commodity Command Standard System
CECOM	Communications-Electronics Command
CG	Commanding General
CMMC	Corps Materiel Management Center
CONUS	Continental United States

COSCOM	Corps Support Command
CSSAMO	Combat Service Support Automation Management Office
CTASC	Corps/Theater ADP Service Center
CWT	Customer Wait Time
DA	Department of the Army
DAAS	Defense Automated Addressing System
DC	Deputy Commander
dCAS	Databased Commitment Accounting System
DCSC	Defense Construction Supply Center
DCSLOG	Deputy Chief of Staff for Logistics
DECA	Defense Commissary Agency
DFAS	Defense Finance and Accounting Service
DIC	Document Identifier Code
DLA	Defense Logistics Agency
DLIS-A	Defense Logistics Information Service-Army
DLR	Depot-Level Reparable
DLSC	Defense Logistics Support Center
D-M-I	Define-Measure-Improve
DMMC	Division Materiel Management Center
DMRD	Defense Management Review Decision
DoD	Department of Defense
DODAAC	Department of Defense Activity Address Code
DOIM	Directorate of Information Management
DOL	Directorate of Logistics
DON	Document Number
DPW	Directorate of Public Works

DRM	Directorate of Resource Management
DRMO	Defense Reutilization and Marketing Office
DS	Direct Support
DVD	Direct Vendor Delivery
DWCF	Defense Working Capital Fund
FCMF	FORSCOM Contractor Maintenance Facility
FEDLOG	Federal Logistics Catalog
FLIS	Federal Logistics Information System
FLR	Field-Level Reparable
FMMC	FORSCOM Materiel Management Center
FORSCOM	U.S. Army Forces Command
FPT	Financial Processing Time
FSB	Forward Support Battalion
FTP	File Transfer Protocol
FWT	Financial Wait Time
FY	Fiscal Year
GBL	Government Bill of Lading
GCSS-A	Global Combat Support System-Army
GS	General Support
GSA	General Services Administration
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HQDA	Headquarters Department of the Army
ICP	Inventory Control Point
IFSMS	Integrated Facilities Management Information System
ILAP	Integrated Logistics Analysis Program
IMM	Inventory Materiel Manager

IMPAC	International Merchant Purchase Authorization Card
ISM	Integrated Sustainment Maintenance
LIF	Logistics Intelligence File
LOGSA	Logistics Support Activity
MACOM	Major Command
MATCAT	Materiel Category
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MIPR	Military Interdepartmental Purchase Request
MMC	Materiel Management Center
MRF	Manager Review File
MSC	Major Subordinate Command
NAP	Net Asset Position
NDI	Nondevelopmental Item
NICP	National Inventory Control Point
NIIN	National Item Identification Number
NSN	National Stock Number
ODCSLOG	Office of the Deputy Chief of Staff for Logistics
OMA	Operations and Maintenance Army
OSD	Office of the Secretary of Defense
OSMIS	Operating and Support Management Information System
OST	Order and Ship Time
PDS	Procurement Desktop System
PIT	Process Improvement Team
PLL	Prescribed Load List
POL	Petroleum, Oils, and Lubricants

REP	Reparable
REQ	Required
RL	Retention Limit
RON	Requisition Order Number
RSF	Retail Stock Fund
SAACONS	Standard Army Automated Contract System
SAILS	Standard Army Intermediate Level Supply System
SAMS	Standard Army Maintenance System
SARSS	Standard Army Retail Supply System
SERV	Serviceable
SFDLR	Stock Funding of Depot-Level Reparables
SIT	Site Improvement Team
SMA	Supply Management, Army
SOP	Standard Operating Procedure
SSA	Supply Support Activity
STAMIS	Standard Army Management Information System
STANFINS	Standard Financial System
STARFIARS	Standard Army Financial Inventory Accounting and Reporting System
S4	Supply Officer (a staff officer at battalion, brigade, group, or regiment level)
TACOM	Tank-Automotive and Armaments Command
TADS/PNVS	Target Acquisition and Designation System/Pilot Night Vision Sensor
TAMMIS	Theater Army Medical Management Information System
TDY	Temporary Duty

TUFMIS	Tactical Unit Financial Management Information System
ULLS	Unit-Level Logistics System
USMC	United States Marine Corps
VG	Velocity Group
VM	Velocity Management
WSF	Wholesale Stock Fund

Chapter One

INTRODUCTION

BACKGROUND

In 1992, the Defense Management Review Decision No. 904 (DMRD 904) required the services to procure and repair all depot-level reparables (DLRs) through their stock funds. Responding to this directive, the Army implemented its version of stock funding of DLRs under the Army Working Capital Fund (AWCF).[1] As a result, customers of the Army stock fund began paying for DLRs, which were previously financed through procurement appropriations and issued free to customers, based on their stated need. Customers also began receiving credits for DLRs returned to the stock fund. Both non-DLR consumables and field-level reparables (FLRs) were stock funded prior to 1992.[2]

[1]In fiscal year 1992, the DoD combined the services' five industrial funds, four stock funds, and several appropriated-fund support activities—including the Defense Finance and Accounting Service (DFAS) and the Defense Commissary Agency (DECA)—into a single working capital fund and required these activities to recover their full costs through customer reimbursement. Initially, the Office of the Secretary of Defense (Comptroller) centrally managed the cash balance of the single revolving fund. However, in February 1996, responsibility for cash management was returned to the services and DoD components, and in December 1996, DoD established four separate funds: the Army Working Capital Fund (AWCF), the Navy Working Capital Fund, the Air Force Working Capital Fund, and the Defensewide Working Capital Fund. Collectively, these four funds are known as the Defense Working Capital Fund (DWCF).

[2]In the Army, consumables and depot maintenance were financed through working capital funds prior to 1992, but not DLRs. Under working capital funding, DLRs are capitalized into the funds, and operating costs are recovered through customer reimbursement rather than direct appropriation of funds. Although surpluses or deficits may develop in the funds from year to year, they must balance out over time.

On a DoD-wide basis, implementing the requirement that DLRs be stock-funded reduced the demand for DLRs by approximately 20 percent, saving approximately $500 million per year.[3] Under working capital funding, Army units and installations were given a financial incentive to diagnose and repair as many items as possible at the Direct Support (DS) and General Support (GS) levels. They also had a new financial incentive to return unserviceable DLRs in exchange for new components and to return items no longer needed in local inventories. Army return rates have increased from approximately 80 percent to over 100 percent for some items.[4]

Although implementing working capital funding reduces Operations and Maintenance Army (OMA) expenditures by logistics customers,[5] it is not clear that it reduces costs from an Army-wide perspective. Working-capital-funded activities depend on sufficient sales revenue from transactions to recover their overhead costs, so when customers take actions that reduce the sales revenue (i.e., go outside the system), the funds may not recover all their costs.

Figure 1.1 shows a simplified version of the flow of funds under the Army's implementation of stock funding and can be used to understand this problem. The three shaded boxes represent the AWCF. Starting on the left side of the figure, operating units at an installation receive funds for spare parts as part of their OMA budgets. OMA budgets also include funds for training, base operating support, and

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Working capital funds were created on a DoD-wide basis by the National Security Act Amendments of 1949. They can be classified as industrial funds or stock funds. Industrial funds finance the operating costs of industrial and commercial-type manufacturing and service activities, such as maintenance depots. Stock funds finance and hold inventories of parts, subsistence, fuel, and other supplies for sale to military units. See Office of the Under Secretary of Defense (Comptroller), *A Plan to Improve the Management and Performance of the Department of Defense Working Capital Funds*, September 1997.

[3]Ibid., p. 13. This report does not indicate the time period over which these savings have been measured. Army data on DLR demands by system (shown in Appendix B) indicate that these savings are ongoing but have been achieved gradually since 1992.

[4]Based on discussions with Tank-Automotive and Armaments Command (TACOM) personnel. There has obviously been a flushing of assets back into the accountability of the AWCF. Return rates above 100 percent were a temporary condition.

[5]The creation of the AWCF actually increased OMA funding to retail customers. It may have reduced their apparent flexibility because they now paid for many expensive items that were previously free issue, while total budgets declined.

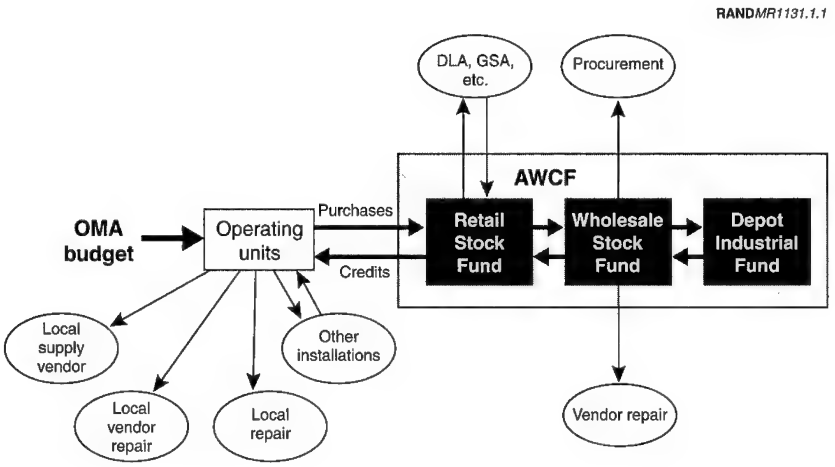

Figure 1.1—Flow of Funds in the Army's Stock Funding System

civilian personnel; thus, if operating units can reduce spending on spare parts, they can use these OMA savings to pay for other activities. As a result, operating units have a strong financial incentive to seek the lowest-cost sources of supply and repair.

Although the intent is to keep supply and repair—and the flow of funds—within the self-contained AWCF region shown in the shaded boxes and the bold arrows, logistics customers on installations have a number of different sources for supply and repair and for spending their funds. They can stay within the AWCF system and purchase spare parts and (in some cases) return items for credit to the Wholesale Stock Fund (WSF), the Defense Logistics Agency (DLA), and General Services Administration (GSA) wholesale supply systems. Financially, these transactions all pass through the Army's Retail Stock Fund (RSF),[6] which has a branch office on each installation. For the most part, the RSF charges the same prices as the wholesale sources of supply, but it offers different credits.

[6]The Army is planning to merge its WSF and RSF into a single stock fund. The planned interim credit policy is similar to the current WSF credit policy, which is considerably different from the current RSF credit policy discussed in Chapter Three.

However, logistics customers in the operating units can also go outside the AWCF system. They can compare the prices and credits offered by the RSF with the costs of other sources of supply and repair (shown on the bottom left side of the figure), when they are available. Customers may be able to buy spare parts from a local vendor or have repairs made by a local vendor when items have commercial equivalents (such as diesel engines and HMMWVs). These types of "local purchase" have been facilitated by the availability of IMPAC[7] credit cards. Using local vendors removes funds from the AWCF system and hence the Army.

In addition, instead of buying a new part and returning the unserviceable carcass, customers may have the capability and capacity to repair a part on the installation (using OMA funds for parts and labor). Moreover, since the advent of stock funding of DLRs, logistics customers have set up new channels of redistribution and repair. The Standard Army Retail Supply System (SARSS) can now redistribute items both within and between installations (as shown in the figure)—keeping the funds in OMA and, hence, within the Army but outside the AWCF system. This option is attractive if customers can resell items for more than the credit they would receive from the RSF.[8] The Integrated Sustainment Maintenance (ISM) program allows installations to pool their repair capabilities and capacities, resulting in reduced purchases from, and returns to, wholesale suppliers. U.S. Army Forces Command (FORSCOM) has also set up major command (MACOM)-wide, OMA-funded redistribution and repair programs—the FORSCOM Materiel Management Center (FMMC) and the FORSCOM Contractor Maintenance Facility (FCMF).

As mentioned above, the shaded areas in Figure 1.1 represent the components of the AWCF. The RSF and the WSF comprise the Supply Management, Army (SMA) activity group. Logistics financial transactions between customers and wholesale sources of supply pass through the RSF. The RSF purchases most consumable items from DLA, GSA, and other sources, as shown on the figure. Most reparable items (i.e., DLRs and FLRs) are purchased from the WSF.

[7]International Merchant Purchase Authorization Card.

[8]Similar transactions can occur among RSF accounts to avoid the WSF.

U.S. Army Materiel Command's (AMC) major subordinate commands (MSCs)—such as the Tank-Automotive and Armaments Command (TACOM) and the Communications-Electronics Command (CECOM)—manage wholesale inventories of DLRs, FLRs, and some Army-unique consumables. Wholesale supply managers in the WSF determine when to repair or procure to replenish wholesale inventories. Before the advent of stock funding of DLRs, the MSCs received appropriated funds to cover the costs of procurement and repair, as well as operating costs. Under stock funding, the MSCs must use WSF sales revenues, net of credits issued, to pay for procurement, repair, and operating costs.

As shown in the figure, wholesale supply managers have two main options for buying repairs. They can purchase repairs from the Army's maintenance depots, which are financed through the Depot Industrial Fund, or from commercial vendors, subject to constraints on the capability and/or capacity of these sources and to congressional constraints on the amount of workload that can be outsourced.[9] Depot repairs come under the Depot Maintenance Activity group. The prices charged by the depots should cover the costs of labor, materials, and overhead. Wholesale supply managers have a financial incentive to choose the lowest-cost source of repair within the above-mentioned constraints, assuming that the quality and responsiveness of the repair sources are comparable.

AWCF financial managers are responsible for maintaining the solvency of the fund. Prices and credits for each activity group are set during the budgeting process so that its fund should break even during the coming budget year. If the activity group has a financial gain or loss during the execution year, it must adjust its future prices and credits to recover losses or return gains to customers. AWCF financial managers must also maintain a cash balance in the fund to cover "7–10 days of operating expenses ($1.5 to $2.1 billion) and cash adequate to meet 4–6 months of capital disbursements ($0.5 to 0.9 billion)."[10]

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[9]Workload can also be sent to other organic government sources of repair (e.g., ISM sites) that are approved for those specific workloads.

[10]*DoD Financial Management Regulation*, DoD 7000.14-R, Vol. 11B, p. 54-16.

Senior Army logistics managers have become concerned that the Army's implementation of working capital funding may not be resulting in cost-effective decisions, when evaluated from an Army-wide perspective. In fact, at the Fall 1998 meeting of the Velocity Group (VG),[11] the Repair Process Improvement Team reported specific evidence. Thirty-two percent of the 154 Class IX national stock numbers (NSNs) being repaired in the FCMF had wholesale serviceable assets above the requisitioning objective (RO). Apparently, FORSCOM found it less expensive to repair NSNs than to purchase them from the wholesale system, even though the wholesale system had an abundance of serviceable assets available for purchase. To put this another way, FORSCOM was spending money on parts and labor to repair assets that the Army already had in abundance.

OBJECTIVE AND APPROACH

Recognizing the need to better understand and improve the logistics financial management process, the Army decided to apply its VM approach—which had been examining logistics processes such as order and ship, repair, and stockage determination—to the financial process as well.[12] As a result, the Army established a Financial Management Process Improvement Team (FM PIT) to apply the VM methodology of Define-Measure-Improve (D-M-I) to the logistics financial management process. In this document, we present the work to date, which has focused on defining the financial management processes at the installation level, conducting exploratory measurements to test the utility of some candidate metrics, and suggesting improvements to financial management processes. Many of the financial management problems we illustrate result from Army policies that single installations or even major commands are unable to change. Therefore, the FM PIT's recommendations tend to focus on

[11]The Army Velocity Group is a coalition of general officers and civilian equivalents that exists to lead and coordinate changes aimed at dramatically improving logistics system performance. Appendix A discusses VM more fully.

[12]For more information on Velocity Management, the VG coalition, and the Define-Measure-Improve (D-M-I) methodology, see Appendix A and the publications by Dumond, Eden, and Folkeson (1995), Edwards and Eden (1999), and Girardini et al. (1996)

policy changes at the Headquarters Department of the Army (HQDA) level rather than changes that can be made at the installation or MACOM level.

The initial focus of the FM PIT has been on the logistics financial management processes that occur on the Army's active-component installations, from the company level through the interface between the operating units or activities, which are funded by OMA appropriations and the supporting installation's RSF component of the AWCF.[13] These processes include (1) reconciling supply and financial information, (2) monitoring spending relative to budgets, and (3) making financial checks to ensure that funds are available before requisitions are released.

Maintaining the VM process improvement approach helps the FM PIT to focus on customer needs and to integrate the efforts of logistics and financial personnel. Because the most visible interface between logistics and financial management occurs in the realm of automated data systems, there is a temptation to focus on systems problems and systems-based solutions. However, customers need financial information, not systems per se. A systems-based approach also tends to perpetuate functional stovepipes between logistics and financial personnel, because the Army controls logistics information systems, whereas DFAS controls financial information systems. Furthermore, since Standard Army Management Information Systems (STAMISs) may take years to change, the FM PIT focuses on continuous improvement within existing systems and the rapid implementation of such enablers as the Integrated Logistics Analysis Program (ILAP), which pulls information from existing STAMISs and presents it to customers in a more user-friendly format.

Thus, when looking for potential improvements to logistics financial management, the FM PIT must ask what the customers need and then propose changes to the systems and/or the training provided to system operators. The information needed for logistics financial processes should be accurate, timely, and presented in a useful for-

[13]In future work, the D-M-I methodology should be applied to financial management processes in the AWCF's Supply Management and Depot Maintenance activities.

mat. This approach is summarized by the FM PIT's guiding principles:[14]

1. Work toward the goal of a seamless logistics and financial management process. This entails facilitating versus impeding logistics support, providing visibility of budget execution status, providing accurate, consistent information rapidly to all customers, and providing useful versus exhaustive information and data.
2. Use stock fund price and credit policy to encourage desired behavior (e.g., reducing the financial penalty for incorrect orders—this would reduce the redistribution of items outside normal supply channels).
3. Continuously improve performance through rapid implementation of innovations.

ORGANIZATION OF THIS DOCUMENT

The remainder of this document is organized around the application of the D-M-I methodology to logistics financial management processes. Thus, Chapter Two discusses our efforts to "define" the logistics financial management process at the installation level by "walking through" the various steps in the process. Chapter Three discusses our efforts to "measure" this process in terms of three metrics. Finally, Chapter Four discusses our efforts to date to "improve" this process in terms of the three metrics. Appendix A provides a brief discussion of VM and the D-M-I approach. Appendix B displays the cost savings for several of the Army's major weapon systems that have been achieved under stock funding.

[14]The FM PIT briefed these principles to the VG on April 15, 1997, at Fort Lee, Virginia.

Chapter Two

DEFINING THE UNIT FINANCIAL MANAGEMENT PROCESS

Following the D-M-I process improvement method described in Appendix A, the FM PIT began by developing a detailed common understanding of the financial management process at the installation level. We focused on tactical-level operating units rather than on higher-level activities or industrial-type organizations (such as depots) during this phase of our research. This chapter documents our definition of the unit-level financial management process. Following a discussion of the information a company commander needs to make financial management decisions, we then turn to how we define the unit financial management process. We first look at what the inputs to the unit's financial management system are and then at what the outputs are. Next, we map the unit financial management process. We conclude by mapping some other related processes.

INFORMATION THE COMPANY COMMANDER NEEDS

The ultimate question that the unit financial management process must answer for the company commander is, "How much money is available to perform the missions for which he is responsible?"[1] In some sense, this is analogous to an individual's personal financial

[1]Most divisions have decided to delegate financial responsibility for parts orders to the company level. If budgets were not delegated to the company level, then decisions to accept or reject requisitions for financial reasons would have to be made at a higher level. Although this delegation of financial decisionmaking creates a greater workload for company commanders, it also allows the commander, who has the most detailed knowledge of his company's needs, to determine which items to buy within a limited budget.

management process, where he has a bank balance, a flow of incoming funds, a set of bills, and some expected future expenses. Figure 2.1 shows the information a company commander must have to make financial decisions. The information coming in to the company commander includes mission-related information, such as upcoming training events; logistics information, such as purchases from the supply system and assets on hand; and financial information, such as budget, prices and credits, and additional funds. To keep his equipment ready, the company commander must decide whether to buy, repair, or return items or defer action within the funding that he has been allocated. These decisions may have ripple effects on higher echelons, just as decisions made at the higher levels ripple downward.

DETERMINING INPUTS TO, AND OUTPUTS FROM, THE UNIT FINANCIAL MANAGEMENT PROCESS

In the D-M-I methodology, the first steps in defining a logistics process are to identify its inputs and outputs. Although the unit financial management process intertwines with other logistics

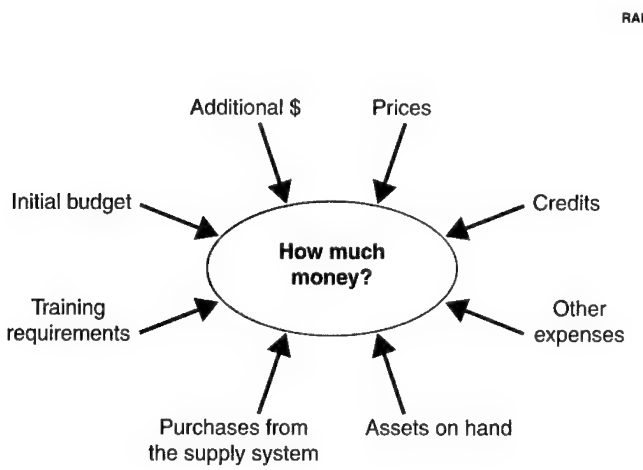

Figure 2.1—Information a Company Commander Must Have to Answer the Question of How Much Money Is Available

processes—order and ship, stockage determination, and repair—it mainly deals with information, both as an input and as an output. Figure 2.2 shows the inputs to, and the output from, the unit financial management process.

As the figure shows, inputs to the unit financial management process include the price of an item to be purchased, the amount of credit expected for the return of an item, supply information on the number and price of parts ordered and received and on the parts returned to the supply system, and the amount of budgeted funds remaining. These inputs to the unit financial management process are outputs created by other higher-level financial management and supply processes, shown in the upper part of Figure 2.2. For example, the catalog provides information on prices, supply reports provide information on parts ordered, received, and returned, and financial reports provide information on remaining funds, based on transactions that

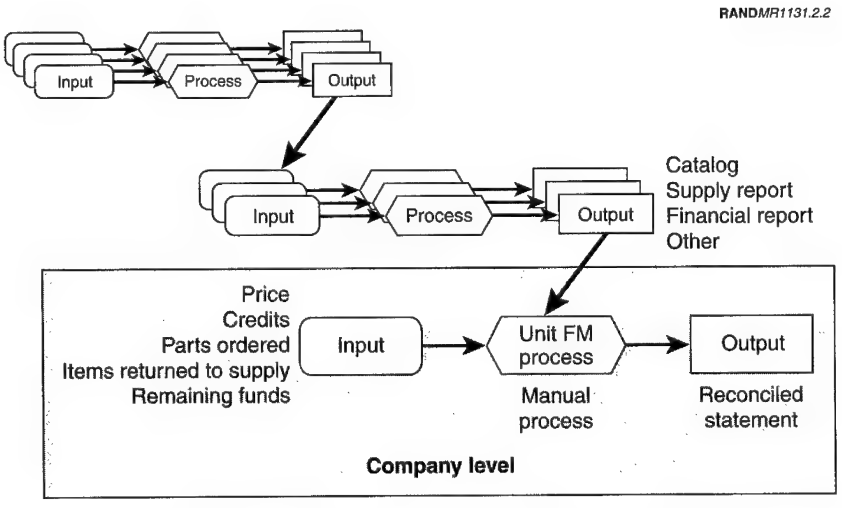

Figure 2.2—Outputs of Other Processes Become Inputs to the Unit Financial Management Process

have cleared.[2] Except for the catalog,[3] the outputs of these processes are usually a series of reports—frequently on paper—that must be reconciled by the company commander or his staff to determine how much money is available. This reconciliation process is unique at each unit: some use "home-grown" spreadsheet programs and others use paper and pencil (Figure 3.1 in the next chapter is an example of such a paper-and-pencil reconciliation).[4]

The output of the unit financial management process is a reconciled statement telling the commander how much money is available for the remainder of the period.[5] Ideally, reports from the financial and supply systems should agree on items received and paid for. But in practice this is not usually the case. Thus, unit-level financial reconciliation is a complex, time-consuming task. From the customer's perspective the need for manual reconciliation appears to be the product of a logistics financial management process that delivers conflicting information to the company commander. Therefore, we focused on mapping the processes that deliver financial and supply information to the company commander to identify the sources of discrepancies among the various information sources. We did not map the reconciliation process itself, since it should not be necessary if consistent information is delivered from the finance and supply systems.

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[2]We did not address the "cash flow" transactions (disbursements and payments) in this research.

[3]The catalog process is discussed at the end of this chapter. The price of a part is obtained from the Army's catalog, and credits are calculated by applying a percentage credit factor to the prices in the catalog based on a return advice code assigned by the supply system. In the future the catalog will also contain NSN-by-NSN credit information.

[4]While current Army policy holds commanders at each level accountable for financial management, Army policy does not specify a format or system to assist commanders with their financial management tasks.

[5]Usually the reports indicate the funds available for the remainder of the year, but typically, units do not receive their entire year's budget at the beginning of the year. Funds are allocated in increments throughout the year. Therefore, the commander only has access to the amount of money phased into the organization to date.

MAPPING THE UNIT FINANCIAL MANAGEMENT PROCESS

To map the process that delivers supply and financial information to company commanders for spare parts,[6] the FM PIT began by "walking through" the process, focusing on the perspective of a unit commander as a customer. The view presented here divides into three parts: (1) the information from the logistics supply system; (2) the interfaces between the Army logistics supply and financial systems; and (3) management reviews.

Flow of Requisitions Through the Logistics Supply System

The flow of requisitions through the logistics information system is shown in Figure 2.3. This element of the unit financial process begins when a unit (a company-level organization) enters an order or makes a return through the Unit-Level Logistics System (ULLS) or the Standard Army Maintenance System (SAMS).[7] When a request[8] is accepted by the servicing Supply Support Activity's (SSA's) automated system, it becomes a financial commitment, that is, a promise to pay similar to writing a check. The request then passes through the Standard Army Retail Supply System (SARSS-1), located at the servicing SSA. If the item is available at the SSA, it is delivered to the company, and the record of the transaction passes through SARSS to the financial system.

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[6]While the focus here is primarily on Class IX, spare parts, there is also some discussion of Class II, clothing, and Class IV, combat engineer supplies, such as barbed wire, cement, etc.

[7]"Company" is used in the process maps to indicate the unit level; however, the same process applies to Troop, Battery, or other requesting activities.

[8]Documents received from a customer that result in the issue of supplies are requests. A supply request is initiated by a using unit (to the supporting SSA). See the glossary in Army Publications and Printing Command, *Inventory Management Supply Policy Below the Wholesale Level,* AR 710-2, October 1997. The request is recorded either through ULLS or SAMS. A request becomes a requisition when it is entered into SARSS by the SSA. "A supply request initiated by the SSA in a Military Standard Requisitioning and Issue Procedures (MILSTRIP) format or a unit supply request converted to a MILSTRIP format by the SSA for submission to the next higher source of supply" is called a requisition. Requests are not assigned a document identifier code (DIC); requisitions are. The requisition DIC A0_ is commonly used to identify a request. See PAM 710-2-2, paragraph 5-4 a.

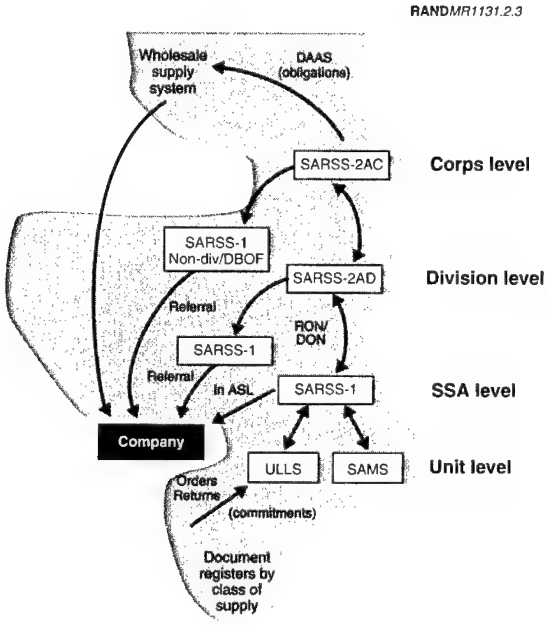


Figure 2.3—Simplified View of a Requisition Passing Through the Army Logistics Supply System

If the item is not available at the SSA and there are no technical errors in the request, it is assigned a document order number (DON) by the SSA, depicted in Figure 2.3 as the request order number/ document order number (RON/DON) process (in some cases, the unit RON is replaced by the SSA DON), and passed to the SARSS-2AD system at the division level. The SARSS-2AD system can search for the item in the Asset Balance File (ABF) of other SSAs in the division, so it may refer the requisition elsewhere within the division. These referral transactions are also recorded in SARSS-2AC and passed to the financial system.

Requisitions for items that are not available within the division pass on to the SARSS-2AC system at the corps level. The SARSS-2AC system can make referrals to nondivisional SARSS-1 systems on the installation, if the item is stocked at the Directorate of Logistics (DOL), for example. If the item is not available on the installation or

if referrals are rejected, the requisition leaves the installation and goes through the Defense Automated Addressing System (DAAS) to the wholesale supply system. This type of transaction is also sent to the installation's financial system to be recorded as a financial obligation. In all cases, the materiel flows through the servicing SSA to the company, regardless of the source of supply.

Flow of Financial and Logistics Information Back to the Unit

In Figure 2.4, the financial information system (shown in the lighter gray region on the left) has been added to show the relationship between the financial and logistics systems. Both on-post and off-post transactions are recorded as obligations in SARSS-2AC and passed on tape (referred to as F02, F08, and F09 tapes) to the Standard Army Financial Inventory Accounting and Reporting System

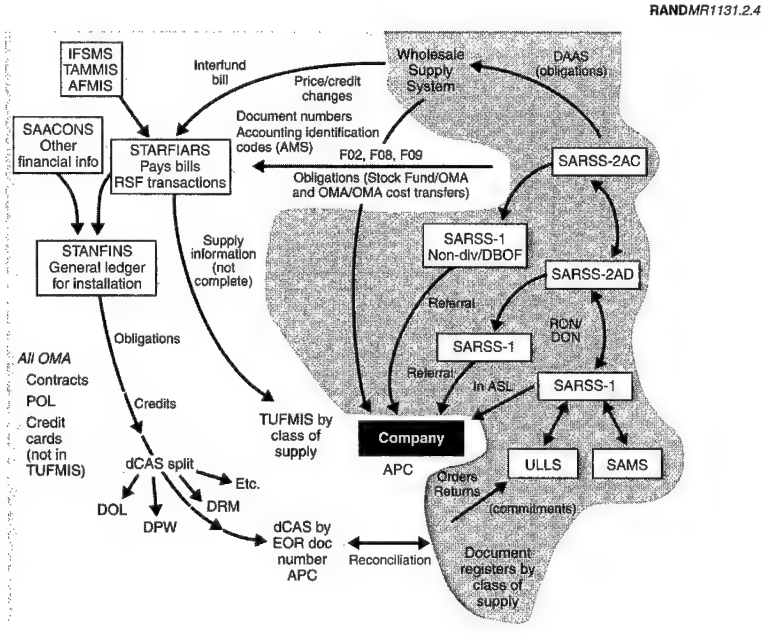


Figure 2.4—The Army Logistics Supply System with Financial System Interfaces

(STARFIARS). These transactions include both OMA-to-stock fund and OMA-to-OMA cost transfers. The wholesale supply system sends interfund bills to STARFIARS for off-post transactions. If a substitute item is provided or a change occurs in the price or credit, this information is recorded in STARFIARS when the bill arrives. Supply transactions from STARFIARS, along with other financial information, feed into the Standard Financial System (STANFINS), which keeps the accounting general ledger for the installation.[9]

Companies may receive financial information from either the Tactical Unit Financial Management Information System (TUFMIS) or through the databased Commitments Accounting System (dCAS), which is then reconciled with logistics information recorded on document registers. TUFMIS draws information from STARFIARS, so it includes only supply transactions. Other transactions (such as contracts, petroleum, oils, and lubricants (POL), and credit card purchases) are omitted. However, TUFMIS is organized by "class of supply," which makes it easier for the company to match with its document registers. TUFMIS is being phased out at most Army installations, but at the time of our initial research it was still used at a few installations, such as Fort Campbell.

Information in dCAS is based on STANFINS, so it includes all of the unit's financial transactions. The dCAS reports are distributed at the installation level to the DOL, the Directorate of Public Works (DPW), the Directorate of Resource Management (DRM), and other organizations. The DRM further disseminates the information to brigades, which pass it to battalions, and then to companies. Thus, dCAS information may take longer to reach the company level than TUFMIS information does. It is also organized by "element of resource" rather than "class of supply" and includes multiple transactions (e.g., from the wholesale system to the SSA and from the SSA to

[9]Other systems shown on the chart but not previously identified are:

IFSMS: Integrated Facilities Management Information System;

TAMMIS: Theater Army Medical Management Information System;

AFMIS: Army Food Management Information System; and

SAACONS: Standard Army Automated Contract System (this system is being replaced by Procurement Desktop System (PDS).

These systems send other types of financial transactions into STARFIARS and/or STANFINS.

the company) that cancel each other out. Thus, it is often harder to match with the company's document registers.[10]

Whether the company uses TUFMIS, dCAS, or both, it must go through a reconciliation process. Reconciliation can be thought of as the unit balancing its "checkbook." The unit "writes a check" when it makes a commitment, and the "check is cashed" when the transaction is recorded in STANFINS. However, since requisitions can be canceled or modified, the company must verify that payments are matched with the physical receipt of items. This process is a time-consuming, frustrating, manual process to reconcile logistics and financial information. Therefore, it is difficult for the unit to keep track of how much funding it has actually spent, how much it has committed on requests still being processed, and how much is left in its budget. In most companies this financial responsibility is an added duty for a uniformed officer, warrant officer, or enlisted soldier—there is no Army standard for who performs this function.

Management Reviews

Figure 2.5 shows the logistics information system in the dark gray shaded region, the financial information system in the lighter gray region on the left, and the management reviews that are imposed on logistics requisitions on the far right of the chart in the unshaded region.

When a company enters a request over a certain dollar threshold (typically $500), it must be checked and signed off by a company commander before it passes into the automated logistics system.[11] When the request is processed at the unit's SSA, it passes through a technical edit (for catalog or other errors) where it may be modified,

[10]"Element of resource" codes group expenditures in different categories than do "class of supply" codes. The important distinction for the unit commander is that his planning guidance for training exercises shows resources by class of supply. It is not easy to translate between the two coding systems. So the unit commander will plan to spend a specific sum for spare parts (Class IX) in support of a specific training exercise, and the dCAS report will not show what was actually spent for Class IX during the exercise. It will show what was spent for supplies and materials (EOR code 26).

[11]This is a review in ULLS, and the dollar value is hard-wired by the ULLS designers. There is no similar review in SARSS for customer requests.

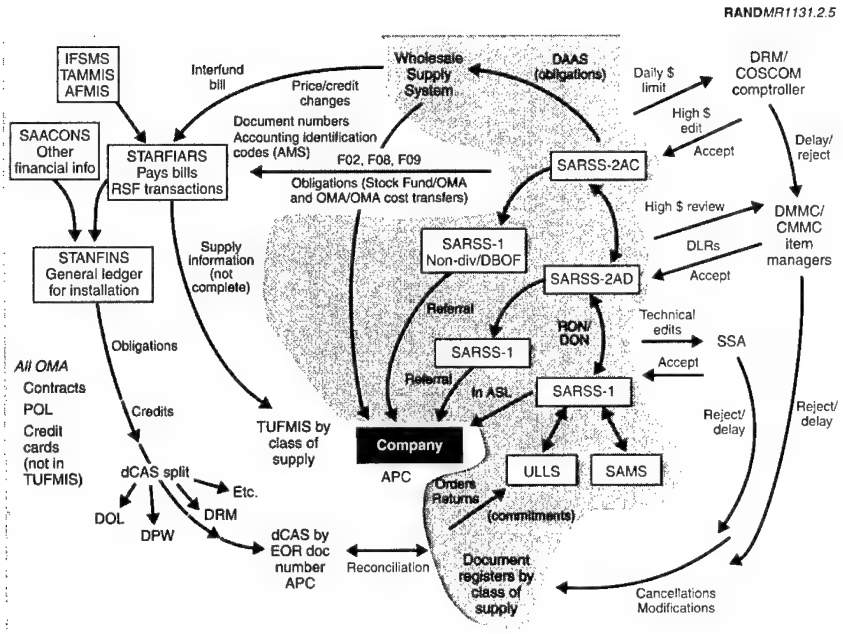


Figure 2.5—The Army Logistics System with Both Financial System Interfaces and Financial Checks

delayed, or canceled.[12] If the item is not available within the division, requisitions over a dollar limit (e.g., $1,000) or for DLRs are usually reviewed by item managers in the Division Materiel Management Center (DMMC) (or the Corps Materiel Management Center (CMMC) at installations that house a corps headquarters). These financial checks may cause the requisition to be delayed or canceled.

[12]The criterion is hard-wired in SARSS based on guidance from the Department of the Army during SARSS development. This technical review is for format and catalog data only. Some examples include the following. If the National Item Identification Number (NIIN) is not in the catalog, SARSS will generate a skeleton record and kick the request out for SARSS operator action. A request with a wrong unit of issue would also be kicked out if the system cannot convert the quantity to the correct unit of issue. A request with a bad acquisition advice code would be rejected during this edit and the customer would be notified to submit the request with exception data.

Requisitions that are accepted pass on to the SARSS-2AC system at the corps level. If the item is not in stock on the installation, it goes through a final set of financial checks by the installation DRM or the COSCOM comptroller. These can include reviews of high-dollar requisitions or a check to ensure that the total dollar limit on daily expenditures is not exceeded. Although the SARSS-2AC system is located at the corps level, these thresholds are set by the installation DRM for installations that do not house a corps headquarters, rather than by the corps itself.[13] Requisitions that exceed the daily dollar limit are typically delayed rather than canceled, since they may be allowed to go through the next day.

Figure 2.5 looks extremely complicated, just as the financial system appears incomprehensible to many users. Nevertheless, this map helps describe the flow of financial information from the initiation of a supply action through the receipt of a credit or debit to the unit's ledger.

As mentioned above, the map shown in Figure 2.5 is a generic installation map. Also, we focused on tactical-level organizations and not on other installation-tenant activities. Each Army installation would have somewhat different installation-specific maps, because both financial and logistics processes vary by site. For example, at Fort Hood, unlike Fort Campbell, TUFMIS data are not fed back to the company.

Variations in the Unit Financial Management Process for Returns and Credits

Return transactions follow essentially the same information paths through SARSS and the installation's financial management systems. Figure 2.6 shows the basic process map of the credit flows. This map is derived from Figure 2.5, with added details on credit flows.

[13]This edit is built into SARSS, but the level is set locally. Technically, the level is set by the installation in coordination with the division, but in practice, it is usually set by the DRM.

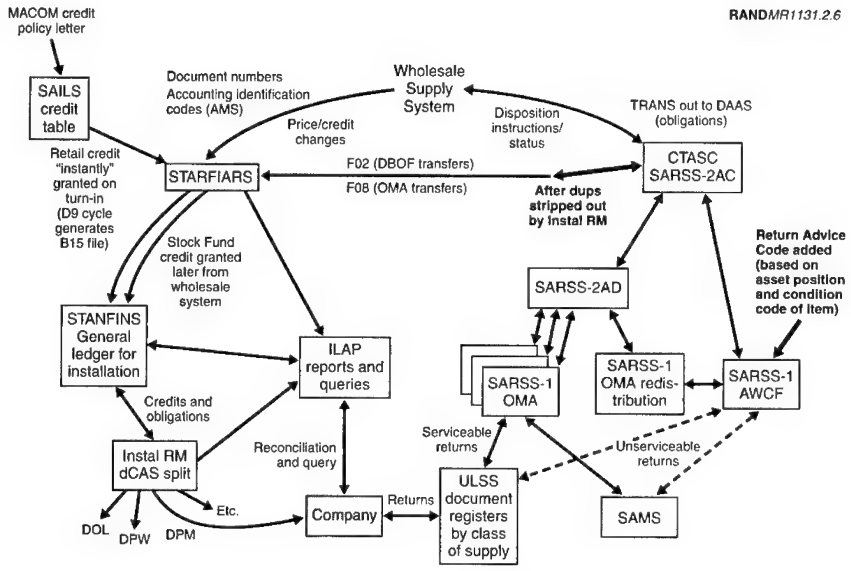


Figure 2.6—Map of the Credit Flows Process

When an ULLS or SAMS customer returns a serviceable item to the supporting SSA for credit, the transaction is entered into SARSS-1. The item is reported to SARSS-2AD, which conducts a search of other SARSS-1 activities within the division to determine whether any of them has a need for the item. If the item is needed by another SSA or if it is stocked and needed at the SARSS-1 OMA redistribution site, it remains within the division's OMA account. The receiving SARSS-1 site posts the item as an increase to its inventory, and a record of the transaction is forwarded to STARFIARS through SARSS-2AC.

If the item is not needed elsewhere within the division or if it cannot be sold within a specified time by the redistribution activity, then the item is turned in to the AWCF SARSS-1 activity. The AWCF SARSS-1 activity determines whether it has a need for the item and assigns a Return Advice Code based on need and the condition of the item.[14] These transactions are reported to STARFIARS through SARSS-2AC.

[14]Credit policy is discussed in greater detail in Chapter Four.

Unserviceable items (i.e., items needing repair) are reported directly to the AWCF SARSS-1 activity. If the installation has a Reparable Exchange (RX)[15] repair program for the item (or if there is an Integrated Sustainment Maintenance (ISM) repair program)[16] and the item is needed on the installation, the customer will receive the RX credit by materiel category (MATCAT). If the item is not repaired or not needed locally, the customer receives a lower credit rate based on the MATCAT and type of item.

When the AWCF SARSS-1 site does not need a serviceable or unserviceable item, it forwards a query through SARSS-2AC and DAAS to the source of supply (Army National Inventory Control Point (NICP), DLA, or GSA). Upon receipt of the query, the source of supply sends a response that provides disposition instructions (e.g., return to source of supply, send to the Defense Reutilization and Marketing Office (DRMO), etc.) and information on whether to expect credit.[17] The AWCF SARSS-1 activity ships the item or disposes of it based on receipt of the response and sends a notification to the source of supply that the item has been shipped. The receiving depot notifies the source of supply when it has received the item.[18] When the source of supply receives either of these notifications, it determines credit[19] (based on wholesale inventory position and condition of the item) and generates a credit decision. If the item is needed at the wholesale level, credit is based on latest acquisition cost (purchase price minus surcharge) for a serviceable return, or latest acquisition cost minus repair cost for an unserviceable return. The source of supply also generates a financial transaction to STARFIARS to refund

[15]Each installation has a reparable exchange program to repair items such as radiators, generators, fuel pumps, etc., that are repairable at the GS level or below.

[16]The ISM program was implemented to allow installations to share their GS repair capability. Installations compete to become the "center of excellence" for repair of specific items. Other installations send their broken items to the center of excellence for repair.

[17]This is credit granted from the WSF or other source of supply to the RSF. It depends on the condition of the item, the acquisition or repair cost of the item, and the wholesale inventory position.

[18]A document identifier code (DIC) that begins with D6_ indicates a nonprocurement materiel receipt.

[19]This is credit from WSF or other source of supply to RSF.

the credit to the RSF. If the item is not needed at the wholesale level,[20] no credit is given.

Any difference between the credit paid by the RSF to the OMA customer and the credit paid by the wholesale source of supply to the RSF is absorbed by the RSF. The RSF also issues credit immediately to the OMA customer when the item is returned to the AWCF SARSS-1 site, even though the RSF must wait until it receives credit from the wholesale supplier. Furthermore, since the credit issued to the OMA customer is based on a percentage of the purchase price, the dollar value of the credit changes if the purchase price changes.

OTHER MAPS OF RELATED PROCESSES

In addition to the series of maps capturing the overall retail-level financial management process (Figures 2.3–2.5), the FM PIT produced a set of more specific maps of other financial management processes, including the process of getting financial information into the Integrated Logistics Analysis Program (ILAP) at Fort Campbell, the end-of-year financial review process and the catalog distribution process. These are discussed below.

Information Flows into ILAP

Early in 1997, as a focused implementation of VM began at Fort Campbell, the division was struggling with the implementation of ILAP as a financial tool. It is important to note that ILAP does not change any data or systems—it is not an official transaction system. It is simply a data-processing tool for integrating logistics and financial information; as such, ILAP is only as good as the data downloaded into it. Figure 2.7 shows more detail on how ILAP interfaces between the supply and financial systems at Fort Campbell. The processes in gray on the left side of the map represent the same financial management processes and systems that appear in Figure 2.5—the overall map of the logistics supply and financial systems

[20]The technical definition for "need" at the wholesale level is whether the asset position is below the "decline" level. This level is computed by the economic retention model. The model computes an economic tradeoff between the cost of retaining items versus the risk of having to procure the items in the future.

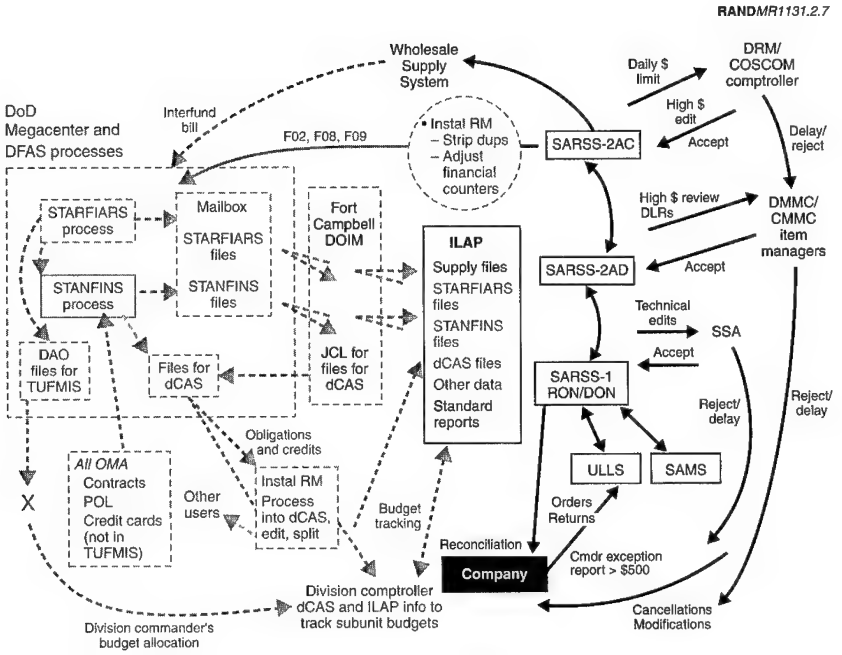


Figure 2.7—Flow of Logistics and Financial Information into ILAP

interfaces—and those in black on the right side represent the same supply systems and financial checks in Figure 2.5.

At Fort Campbell, ILAP sends an automated query to the installation's Directorate of Information Management (DOIM), which then queries the DoD Megacenters, where the DFAS and installation financial management data files actually reside. ILAP automatically receives the appropriate logistics transaction file from SARSS-2AC.[21] A supply or financial manager can then query ILAP for ad hoc reports

[21]Although there is an automated process for sending supply information, the files are not always transferred at the appropriate time. Interruption can be caused by field exercises or by failures in the intranet system or servers. The financial management information can also be sent automatically rather than in a query fashion, but at the time of our study, Fort Campbell had not funded the intranet and other electronic connectivity and automated systems management activities needed to execute this capability.

and can specify routine, fixed-format reports. The intent is to have an automated report that assists with reconciling supply and financial information at the division level. The system does not perform the reconciliation, but rather presents a history of the relevant transactions. It is up to the user to decide which information is more accurate and then manually correct errors in the source system. ILAP does not have the ability or authority to change source information in logistics or financial management transaction systems. ILAP provides research capability for the division comptroller to reconcile both supply and financial discrepancies that company commanders identify.

Map of the End-of-Year Financial Review Process at Fort Campbell

By following the requisitions through the system, the FM PIT discovered how financial managers operate during periods of tight fiscal control—either at end of the fiscal year or when funding levels are significantly constrained during a given fiscal year.[22] (See Figure 2.8—notice that the lower left corner of the figure comes from the center portion of Figure 2.5.)

During those times, financial managers[23] held requisitions for an additional "final" review before passing them to the wholesale supply system. The requisitions were held in a manager review file (MRF) until a financial manager checked the total dollar value and then increased the dollar counters in SARSS to allow the requisitions to pass. There were no indications that any requisitions were ever canceled or rejected as a result of this review. The potential delay was overcome by estimating the amount of funds required for each day and then entering the estimated amount through the SARSS-2A work station the day before the funds were required. If the daily require-

[22]The controls discussed in this chapter always occur at the end of the fiscal year but may occur at other times during the year when funding levels are constrained. Because budgets are allocated in "phases" throughout the year, organizations can run low on "phased funds" just as they can run low on funds at the end of the year.

[23]The "end-of-year financial managers" at installations are typically a division/installation composite team comprising representatives from the DMMC, the installation resource management office, and the installation director of logistics' RSF manager.

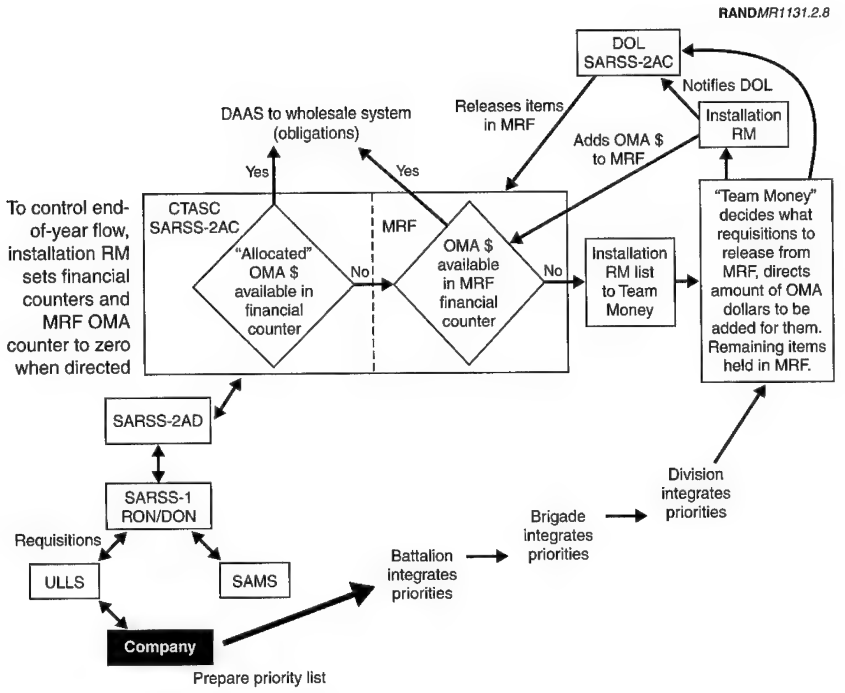


Figure 2.8—Map of the End-of-Year Review Process at Fort Campbell

ment exceeded the estimate, the financial manager reviewed the requisitions to determine why. The financial manager then determined whether additional funding allocations should be made; at Fort Campbell, a division/installation composite team of financial and supply managers—"Team Money"—made these decisions.

The FM PIT's review of parameter settings at the SARSS-2AD level (i.e., DMMC/CMMC) indicated that many of the same customer documents were sent to yet another manager for a second review. In most cases, the manager review consisted of calling the same person who had approved the request at the unit level. There were no indications that any requests were ever rejected. (See Chapter Four for recommended changes in this process.)

Map of the Catalog Distribution Process

We observed that the automated systems retrieved item prices from an on-line catalog at the time of the transaction. In many cases, the catalog being used at one location at a given time was different from that being used at other locations at the exact same time. Therefore, it became apparent that the catalog distribution process also had to be mapped. During process walks, installations complained that the new monthly catalog did not arrive until the middle of the month, and we found that to be true.[24]

Figure 2.9 shows the map of the Army's monthly catalog distribution process as it existed at the time of our study (January through November 1998).[25] Our map shows generic timelines, but this discussion focuses on specific months to illustrate one example. For the catalog effective April 1, for example, the Army Inventory Control Points (ICPs) input their price changes or additions into the Army Commodity Command Standard System (CCSS) between January 1 and February 28 (30 to 60 days prior to effective date). Defense Logistics Information Service-Army (DLIS-A) makes other changes as guided by the AMC major subordinate commands.[26] These changes are then sent by CCSS to the Army Logistics Support Activity (LOGSA) for Army-unique data and to the Federal Logistics Information System (FLIS) for common items. After FLIS updates its files, it sends the updated information to LOGSA. LOGSA integrates the

[24]DoD has an "effective dating" process—updates are effective the first day of the month—that is supposed to ensure retail-level supply activities see the same data as the wholesale inventory control point (ICP). However, personnel in the Army Secretariat (ASAFM&C) and at RAND confirmed that catalog CD-ROMs effective the first of the month arrived between the 11th and the 17th of the month.

[25]This section discusses only the monthly update process to the catalog rather than the annual price change process. It highlights several causes of differences between catalogs at unit-level supply and maintenance activities and at wholesale and retail supply activities.

[26]The DLIS-A is the section of DLIS dealing with common items acquired by the Army. DLIS-A has computers that are connected to CCSS. When certain files are changed in CCSS, the DLIS-A functional analysts, based on guidance from the Army MSC, change appropriate catalog-related CCSS files pertaining to DoD common items. At the time of our study, the Army was in transition to this new procedure; the Army previously had responsibility for this catalog-input procedure. This new procedure will have information updates in CCSS for common items directly made by DLIS-A personnel rather than by the Army.

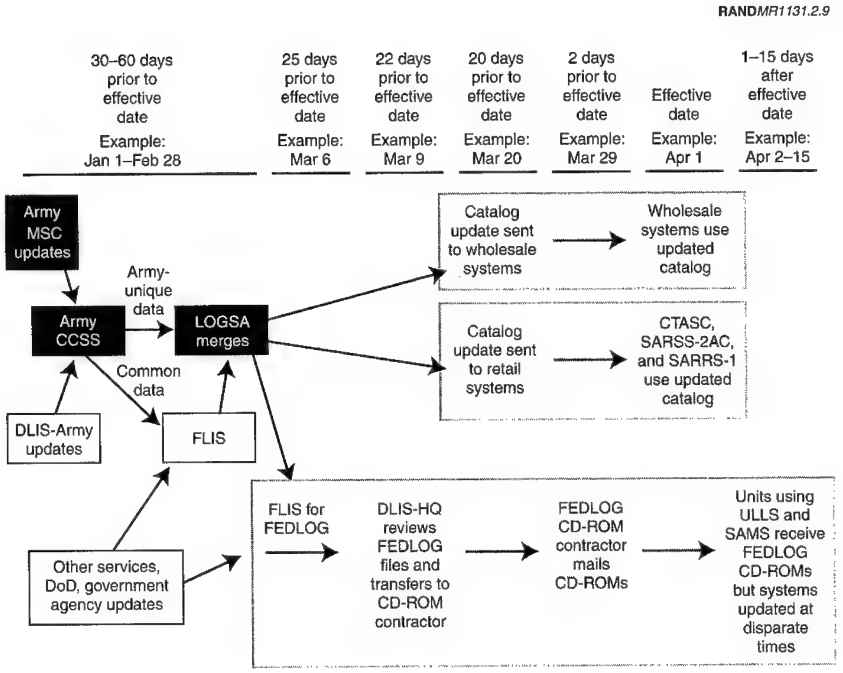


Figure 2.9—Map of the Army's Monthly Catalog Process

information from CCSS and from FLIS into a database and prepares an updated product (the Army Master Data File (AMDF), Supply Bulletin 700-20, and packaging information) in versions compatible with Army supply and maintenance systems. The Army then has until March 6 (25 days prior to effective date) to submit these changes as input for FLIS's Federal Logistics (FEDLOG) database operated by DLIS. FLIS compiles the new Army catalog as part of the FEDLOG catalog, to be effective April 1. DLIS Headquarters reviews the new FLIS FEDLOG and then provides it to a contractor for reproduction in CD-ROM format and distribution to DLIS customers. This step takes about three days.

The contract specifies that the CD-ROMs will be mailed to customers no later than 20 days after DLIS provides the FEDLOG files to the contractor. DLIS's objective is to have the CD-ROMs mailed no later than the end of the month prior to the effective date. These CD-

ROMs are mailed to customers just as any Army publication is mailed. Thus, it is likely that the unit clerks do not receive their monthly catalog until sometime between the 2nd and the 15th of the month. The supply and maintenance specialists operating ULLS and SAMS most likely receive the updated CD-ROMs even later.

On a parallel timeline, LOGSA integrates the information from CCSS and FLIS into its database and by March 20, LOGSA sends the catalog on magnetic tapes to all Army Corps/Theater ADP Service Center (CTASC) sites and CCSS sites. It is up to the receiving sites to load the tape so that it is available on the first of the month. The CTASC sites extract changes from their version of the catalog and send them as updates to the SARSS-2AC and the SARSS-1 sites under their purview. Therefore, under then-existing procedures, it was nearly guaranteed that the supply system catalogs would be out of phase with their customers' (i.e., ULLS and SMAS) catalogs for anywhere from a couple of days to several weeks. Discrepancies between the catalogs used at various levels are another source of potential differences between the unit's supply and financial records, further increasing the manual reconciliation workload.

CONCLUSION

A review of all the process maps makes it very clear that financial and logistical reconciliation of both prices and credits is a time-consuming, manual process. It is often difficult for the unit to track its commitments, obligations, and credits. Funds availability requires units and the comptroller to reconcile logistical and financial transactions periodically. Therefore, units must maintain an informal ledger (dCAS, TUFMIS, spreadsheets) to estimate the availability of funds and exercise decentralized fund control. This problem suggests clear areas for process measurement, which is the focus of Chapter Three.

Chapter Three

MEASURING THE FINANCIAL MANAGEMENT PROCESS

Under the D-M-I methodology, after a process has been defined (as described in Chapter Two), the next step is to measure its current performance. VM calls for measurement along three dimensions: time, quality, and cost. Based on what was learned during the definition stage and data availability, the FM PIT identified three metrics: (1) the quality of price information, (2) the quality of credit information, and (3) the financial wait time (FWT), defined as the time it takes for a supply transaction to be closed out in the financial system. These are three performance metrics for which the current Army information systems provide the data needed to understand current performance and to monitor the effects of improvement efforts (which are discussed in Chapter Four). In the remainder of this chapter, we discuss these metrics and demonstrate some of the diagnostic insights they can provide.

QUALITY OF PRICE INFORMATION

A customer receives high-quality price information if he knows the price he will be charged at the time the requisition is placed.[1] This is not always the case in the Army's current price policy. Perhaps the best way to understand the problems of the quality of price informa-

[1]Using current Army systems, it is not technically possible to measure price changes from the ULLS/SAMS request through to actual receipt price. However, the price initially recorded in SARSS (which may be different from the ULLS/SAMS price) is carried on a STARFIARS transaction record. Using STARFIARS, it is possible to count the number of transactions on which the price changes between initial requisition and receipt. The goal for "perfect price quality" in this case is zero price changes.

tion is to look first at the problem from the unit's perspective and then take a more overarching installation perspective.

The Unit Perspective

During the FM PIT's process walks at Army installations, they observed many conscientious clerks manually adjusting their units' records of prices to correspond to the latest computer printouts. At Fort Campbell, the price reconciliation process worked as follows. The units received weekly TUFMIS reports from the battalion supply officer (S4). The TUFMIS report lists transactions in document number sequence and is organized by class of supply. It includes the unit prices obtained from the catalog and sums the cumulative expenditures for the week. The S4 receives the dCAS report monthly. The monthly dCAS report is organized by element of resource and includes more than supply information. It is used to compile a spreadsheet that accounts for temporary duty (TDY), government bills of lading (GBL), credit card charges, military interdepartmental purchase requests (MIPRs), and contract funding, not all of which are captured on TUFMIS. The TUFMIS report is then reconciled against the supply information in the dCAS report. The dCAS report is then reconciled with the S4's spreadsheet.

Figure 3.1 reproduces an actual supply reconciliation sheet from one of the installations visited by the FM PIT. It shows numerous requests by document number in which the request price has been marked out and replaced by the receipt price. Most of the differences between requisition price and receipt price were very small. This reconciliation is typical of what the FM PIT has observed at every installation visited: Forts Campbell, Hood, Bragg, Polk, Lewis, and Sill, and Carlisle Barracks. Many clerks have to review their records for differences between the requisition price and the receipt price, but usually they only examine major differences.

The Installation Perspective

Because of the FM PIT's concern about the workload being generated by this reconciliation process, we sought to identify the fre-

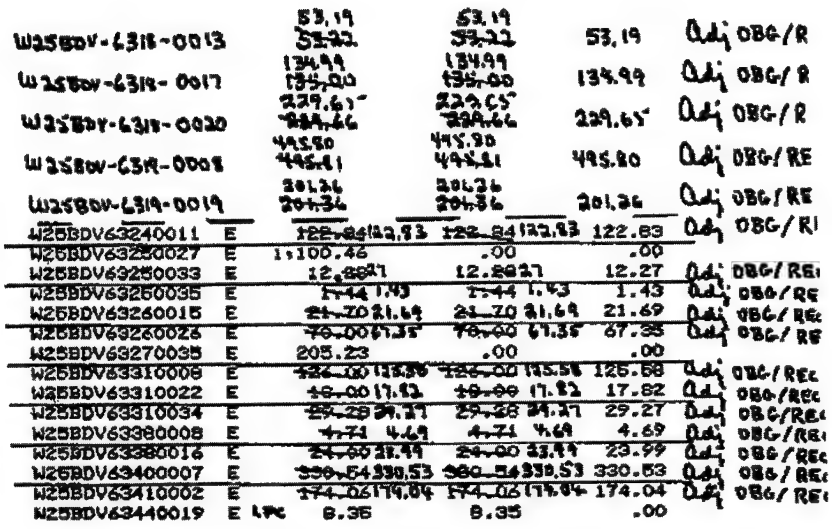
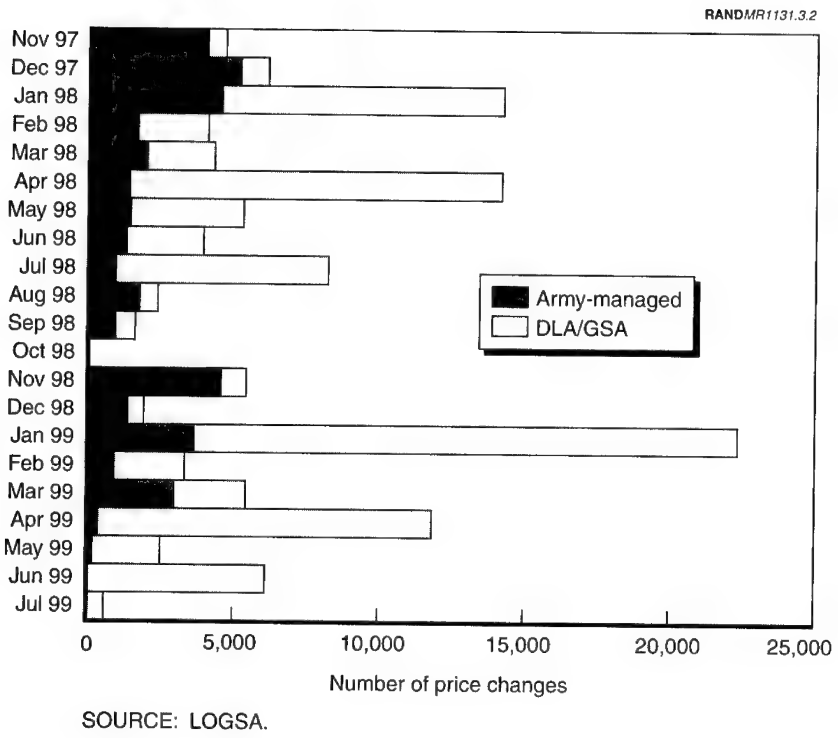


Figure 3.1—Example of Retail Stock Fund Manager's Attempt to Account for Price Differences

quency and timing of price changes. DoD requlations state that most prices should only change once a year,[2] but we wanted to determine how frequently price changes actually appeared in customer records. First, we analyzed STARFIARS and AMDF data to determine the extent of price changes. We also asked financial managers how the prices are recorded in the financial system. Finally, we combed through Army documents on SARSS and STARFIARS to understand the logic behind the financial systems, and we reviewed Army and DoD price regulations.

Figure 3.2 presents measurements of the quality of price information in terms of the number of price differences that are observable using AMDF catalog data. This analysis clearly showed that price differ-

[2]"A standard price will not be changed during the fiscal year without the prior approval of the Office of the Under Secretary of Defense (Comptroller) except as provided in paragraph I.5." (*DoD Financial Management Regulation,* Vol. 11B, December 1994, p. 55-17)



SOURCE: LOGSA.

Figure 3.2—Frequency of Catalog Price Changes

ences occur throughout the year, with large spikes in April and January. Previously, many believed that prices only changed at the end of the fiscal year, even though there are some exceptions to the DoD regulations on price changes.[3] Figure 3.2 does not show price changes in October, because most prices change at the end of the fiscal year, when a new surcharge is established and latest acquisi-

[3]DoD regulations (*DoD Financial Management Regulation*, Vol. 11B, December 1994, p. 55-21) allow prices to be changed within a given fiscal year for the following: (1) subsistence items sold to commissary, (2) subsistence items for troop issue, (3) clothing items for mandatory clothing bag, (4) unit of issue changes, (5) first-time/follow-on buys, (6) price challenges or breakouts, (7) discount product prices, (8) customer-requested product changes, and (9) seasonal price variations for items on direct vendor delivery (DVD).

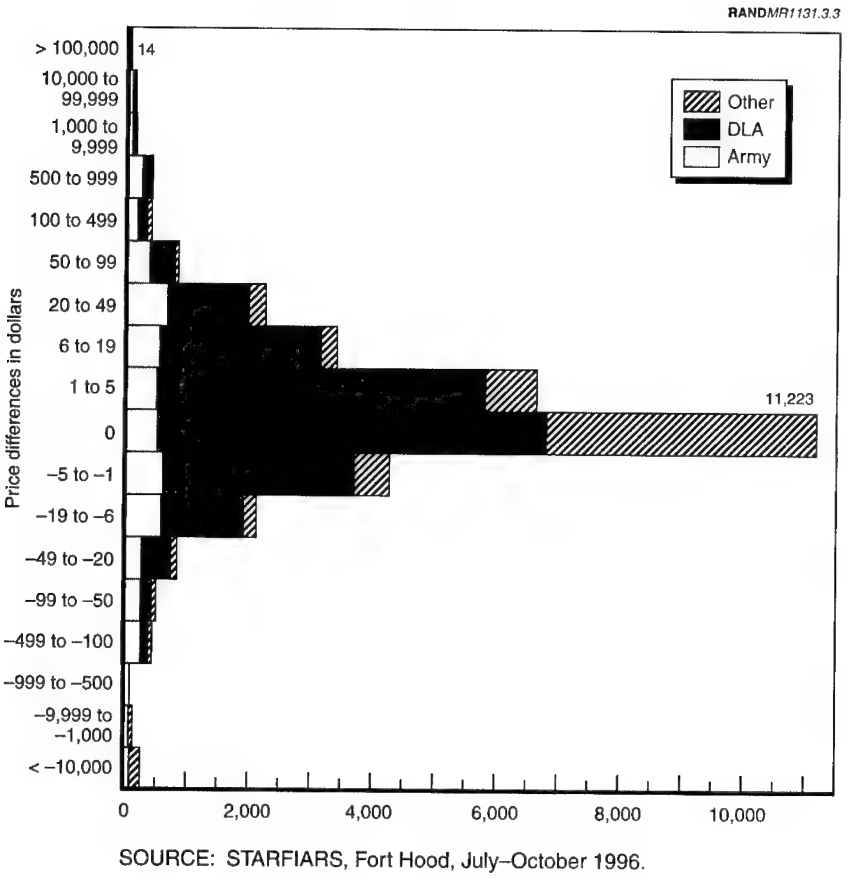
tion costs are updated. The large spikes in January 1998 and 1999 are the result of corrections to the new prices in the October version of the catalog. The large spikes in April 1998 and 1999 are primarily the result of GSA and DLA price changes.

Figure 3.3 displays the distribution of the price discrepancies at Fort Hood from July to October 1996 based on STARFIARS transactions. We note that the number of requisitions with price increases almost mirrors the number with decreases. The average dollar value transferred per requisition was almost zero—a net increase of 81 cents per requisition. Also, most of the price discrepancies are for small amounts: $5 or less. However, it is the large price discrepancies—those in the tails of the distribution—that hurt units the most. Commanders always remember the $10,000 change, since they are responsible for staying within budget. Such a large change occurring at the end of the fiscal year, when budgets are most vulnerable, is of great concern.

The distribution of price differences varied somewhat by the source of supply. For Army-managed items (gray) the number of requisitions with price differences was fairly constant in the range –$20 to +$50. The bulk of DLA-managed items (black) had price changes in the range –$5 to +$5; this would be expected because in general DLA manages less-expensive items. The other category (cross-hatched) includes GSA items (usually very inexpensive) and items managed by other suppliers.

The net dollar value of the changes for Army-managed items was an increase of about $90,000. For the other sources of supply, the net monetary effect was negligible. Thus, it seems that a lot of financial turmoil is generated over a relatively small amount of money.

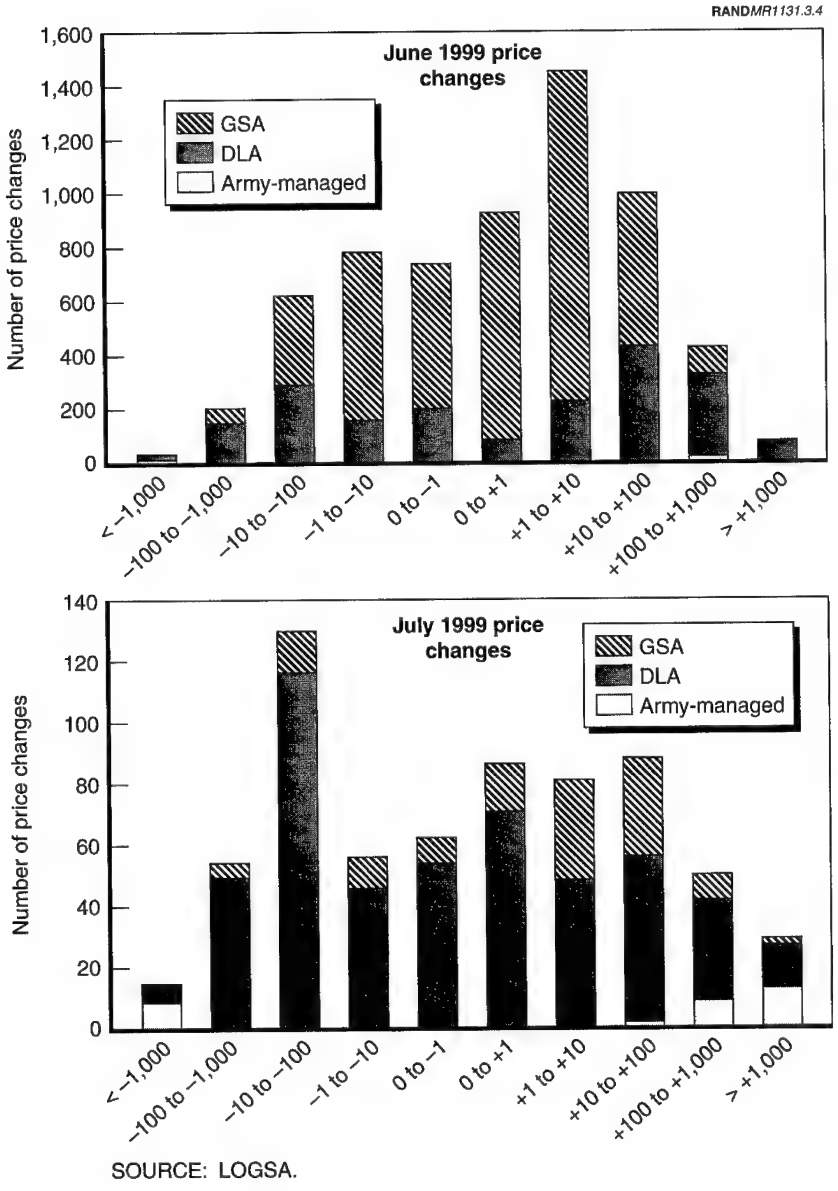
Figure 3.4 shows the distribution of AMDF catalog price changes in June and July 1999. The scales on the two graphs are different because there were many more catalogue price changes in June 1999 (6,158) than in July 1999 (651). However, in June 1999 there were more price increases (74 percent of the changes increased the price) than in July 1999 (51 percent of the changes increased the price). Although it is important to look at the price changes in the catalog, operating units are only concerned with the prices of items that they actually order. Thus, the distribution they are most concerned with



SOURCE: STARFIARS, Fort Hood, July–October 1996.

Figure 3.3—Distribution of Price Changes in Actual Requisitions

is the "bell-shaped" graph in Figure 3.3. All of the price change distributions clearly show that large price changes in mid-year are less common than small changes. The large price changes affect the unit's financial well-being, but all price changes contribute to the unit's financial reconciliation workload.



SOURCE: LOGSA.

Figure 3.4—Distribution of Catalog Price Changes in June and July 1999

Table 3.1 shows a sample of items from STARFIARS transactions for which the requisition price differed from the receipt price. All these items were ordered and received in the same fiscal year. Each line represents a requisition from an OMA-funded unit at Fort Campbell for an item purchased from the RSF. The table is read as follows:

- The first column identifies the ordered part's NIIN.
- The second column is the Julian date on which the document number was assigned in SARSS: 97045 is the 45th day of 1997 (February 14, 1997).
- The third column is the quantity on the requisition; all of these requisitions had requisition quantity equal to receipt quantity.
- The fourth and fifth columns show the price at the time of the requisition and receipt, respectively. The requisition obligated OMA funds for the amount shown, and the receipt disbursed OMA funds to the RSF.
- The last column shows the effect on the unit's OMA funds. Sometimes, the price difference was in the unit's favor—it paid less than it had expected; sometimes, the reverse occurred—it paid more than it expected. (Negative values are shown in parentheses.)

Table 3.2 is similar to Table 3.1. It compares the amount paid by OMA-funded customers with the interfund bills sent by the wholesale supply system. The customers use OMA funds to pay the RSF for the requisitioned item at the time of receipt, and the RSF pays the interfund bill when it is received from the WSF or other source of supply. These price differences are absorbed by the RSF.

The first five columns are defined in the same way as those in Table 3.1 (although the data are different). The last column shows the amount of money the RSF paid to the wholesale supplier. For each of these requisitions, the dollar amounts in the last three columns are different. That means that the amount of OMA funds obligated was different from the amount of OMA funds disbursed to the RSF, and the amount of funds the RSF disbursed to the wholesale supplier was different from the amount of money received from the OMA customer. Again, this set of actual transactions was chosen for illustrative purposes only.

Table 3.1

Examples of Mid-Year Price Changes: OMA to RSF

NIIN	Document Date	Quantity	Requisition Amount	OMA to RSF Amount	Impact on OMA Funds
010281687	97045	2	$4,633.79	$4,998.88	($365.09)
012479542	97125	1	$3,399.47	$872.02	$2,527.45
010876840	97006	3	$2,061.93	$1,468.61	$593.32
005961510	97029	1	$1,597.04	$1,191.82	$405.22
011934773	97055	3	$214.00	$117.44	$96.55
013924969	97078	30	$183.25	$203.00	($19.75)
012146441	97107	15	$130.00	$83.73	$46.27
011856236	97027	25	$65.20	$96.50	($31.30)
008526597	97041	10	$60.08	$30.46	$29.62
010363495	97055	54	$52.28	$63.70	($11.42)
013467811	97134	20	$50.43	$1.78	$48.65
005303770	97051	14	$46.66	$96.65	($49.99)
013913193	97016	45	$24.83	$46.66	($21.83)
008000996	97006	200	$21.96	$19.60	$2.36
011884522	97104	20	$2.00	$38.87	($36.87)
001419080	97070	100	$0.20	$7.80	($7.60)

SOURCE: STARFIARS, Fort Campbell, April–August 1997.

Table 3.2

Examples of Mid-Year Price Changes: OMA to RSF, RSF to WSF

NIIN	Document Date	Quantity	Requisition Amount	OMA to RSF Amount	RSF to WSF Amount
008000996	97006	200	$4,392.00	$3,920.00	$4,312.00
002908036	97083	1800	$2,448.00	$2,520.00	$2,358.00
001817174	97066	52	$1,295.84	$1,138.28	$1,039.48
002125325	97135	4	$752.72	$838.56	$828.00
004231596	97044	1	$592.39	$629.52	$651.63
013352623	97066	7	$174.09	$152.88	$139.58
013758662	97114	4	$91.52	$370.80	$140.24
007350732	97051	15	$83.85	$120.90	$120.15
007350732	97056	5	$27.95	$40.30	$40.05
002223525	97071	10	$27.80	$21.10	$21.50
002050371	97094	6	$2.04	$3.24	$3.54
001800727	97009	1	$1.16	$2.90	$0.87

SOURCE: STARFIARS, Fort Campbell, April–August 1997.

Diagnosing One Source of Poor Quality

These measurements of the quality of price information led to an attempt to diagnose one source of poor quality: Price is not part of the requisition information that is passed through the logistics and financial processes. The Army's logistics and financial systems allow prices to change at the time of obligation, receipt, and interfund billing.[4] Each time a supply action occurs, the price is reassigned by SARSS-2AC or the wholesale source of supply, based on the catalog that is effective at that time and in that system. Figure 3.5 is a stylized chart showing how supply actions are recorded in STARFIARS, the installation's RSF accounting system. In the normal case, the price (shown here as $100) stays the same on each order and receipt financial transaction. However, there are several different points between the requisition and the receipt at which price changes could occur. We discuss three cases below.

Price differences between the STARFIARS obligation and receipt. When a customer places an order, an obligation is recorded in STARFIARS at the price in the SARSS-2AC catalog at that time (shown in Figure 3.5 surrounded by a rectangle).[5] However, the unit is not charged for the item until it is receipted. As discussed in Chapter Two, LOGSA sends each SARSS-2B activity a monthly tape of all catalog add, change, and delete transactions (Document Identifier Codes CPA, CPC, CPD, and CQD)[6] that have occurred since the last Catalog Master File update. The SARSS-2B activity must then run a monthly catalog update process to update its internal files. If a catalog update occurs between the time of the requisition and the receipt and then STARFIARS runs its monthly reconciliation process, the obligation

[4]DoD policy states that "the dollar amount of unfilled customer orders accepted at the previous fiscal year's standard price shall be adjusted (upon notification to the customer) to reflect the latest standard price when notice of the price change is received." *DoD Financial Management Regulation,* DoD 7000.14-R, Vol. 11B, p. 55-17. The effect of this policy is that the customer pays the price at the time the item is received, not the price in effect at the time of requisition.

[5]Note that the price the unit has in its FEDLOG is not passed forward to the SARSS-2AC.

[6]See Army Publications and Printing Command, *Requisitioning, Receipt, and Issue System,* AR 725-50, November 1995, for the definition of these DIC codes.

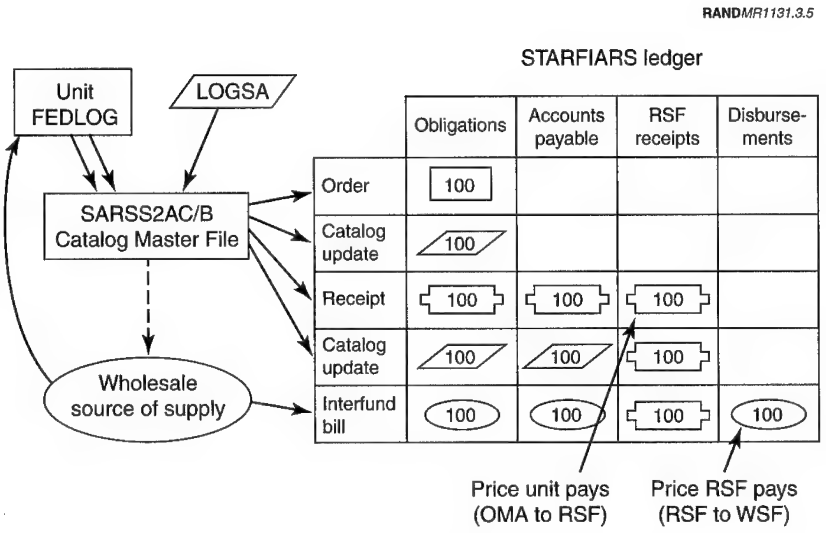


Figure 3.5—How Prices Are Recorded in STARFIARS

recorded in STARFIARS could be updated (shown surrounded by a parallelogram) and the requisitioner notified of any changes.[7]

When the SSA receives the item, the receipt is recorded in SARSS; the SARSS-2AC box assigns the price that is effective in the Catalog Master File on that date and then sends the information to STARFIARS (shown surrounded by a cross-box). STARFIARS records this price as a receipt from the unit and an account payable to the source of supply. It also updates the obligation if the price differs from the original obligation. The receipt price is the actual price the unit pays. Its money is transferred from OMA to the RSF, and the receipt price is recorded in its financial reports. The price changes shown in Tables 3.1 and 3.2 (columns 4 and 5) include this type.

[7]Because the catalog updates and the monthly reconciliation process do not occur at the same time each month or at the same time across the Army, units do not always receive price change notices.

Price differences between the receipt and the interfund bill. Another catalog update (shown surrounded by a parallelogram) could potentially occur between the time the receipt is recorded and the time the RSF receives an interfund bill, if the requisition was sent to a wholesale source of supply. (If the requisition was satisfied locally, the RSF pays the sending unit the same amount it received from the ordering unit.) If a catalog update occurs between the receipt and the interfund bill, the RSF's obligation and account payable are changed, but not the receipt, because the RSF has already received this amount from the unit. The price changes shown in Table 3.2 (columns 4, 5, and 6) include this type.

The interfund bill could also differ from the receipt if there is a discrepancy between the SARSS catalog and the catalog at the wholesale source of supply. When an interfund bill is sent from a wholesale source of supply to the installation's RSF, it attaches the price that is effective in its own catalog at that time (shown in an ellipse in Figure 3.5). Each wholesale source of supply (AMC's MSCs, DLA, GSA, other services) has its own catalog. This price is recorded in STARFIARS as a disbursement from the RSF to the WSF for Army-managed items, or to other stock funds for non-Army-managed items. If the price on the interfund bill differs from the previously recorded price, the RSF's obligation and account payable are updated, but not the receipt from the unit.

The interfund bill is sometimes received before the item is receipted. In this case, STARFIARS records a disbursement and automatically generates an equal account payable, creating an "inventory in-transit (paid)" condition. It also adjusts the obligation if necessary. The RSF pays the price on the interfund bill to the WSF or other source of supply. The unit then pays the price that is effective in the SARSS-2AC Catalog Master File when the receipt is recorded. In Chapter Four we suggest a pricing policy that could help eliminate these price differences and thus their negative effects.

Price differences between the document register and the STARFIARS obligation. In addition, price differences can arise between the unit's document register and the STARFIARS obligation. These differences cannot be observed in the STARFIARS data. When a unit places a request, ULLS records the price in the unit's document register based on the FEDLOG (or ARMYLOG) catalog, a CD-

ROM that is updated monthly. When the requisition passes into SARSS, the price is reassigned based on the Catalog Master File in SARSS-2AC/B before the obligation is recorded in STARFIARS. Under several conditions, there can be differences between the price recorded in the unit's document register and the obligation recorded in STARFIARS:

- If there are discrepancies between FEDLOG and the Catalog Master File,
- If the unit does not receive its new FEDLOG CD-ROM on time,
- If it fails to upload the new CD-ROM at the right time.

Price differences that arise from these conditions are not included in Tables 3.1 or 3.2, because we could not observe this type of price difference in the current data samples from STARFIARS. In STARFIARS, we only see the obligation that is recorded based on the SARSS catalog. We cannot observe any additional price differences that may emerge when the unit performs its manual reconciliation between its document register and its financial reports from dCAS or TUFMIS.

QUALITY OF CREDIT INFORMATION

A customer receives high-quality credit information if he knows the credit he will receive at the time he returns an item and if the credit is granted consistently time after time for similar items. This is not the case in the Army's current credit policy. In examining the quality of credit information, we discovered two problems, one having to do with the variability in funds received for turn-ins and one having to do with the nature—or demographics—of what is being turned in for credit. We discuss both in turn.

Variability in Funds Received for Turn-ins

Walkthroughs of the financial management process at Fort Campbell indicated that the amount of credit received for returned items (turn-ins) is very important to the financial well-being of all units. As at other installations, the budgeting process generally allocates about half the funds a unit needs for logistics support and assumes that the

remaining funds will flow to the units through credits received as items are returned.[8]

These turn-ins are big business for the installations, as shown in Table 3.3, which is based on STARFIARS data for Fort Campbell and Fort Hood. The data show that hundreds of thousands of items were returned at both installations over four-month periods. Most of the items returned were serviceable and most were consumable. The table also shows a wide variation in the percentage of returns receiving 100 percent credit. At Fort Campbell, more items (28 percent) received 100 percent credit than at Fort Hood (1 percent). The bottom line is that Fort Campbell OMA customers received 72 percent of the purchase price of the items as credit (on average), whereas Fort Hood OMA customers only received around 46 percent.

There are several reasons for this difference. Fort Campbell has special repair programs for Target Acquisition and Designation System/Pilot Night Vision Sensor (TADS/PNVS) items and aircraft engines, fast repair cycle times, and very low washout rates. To encourage units to return broken items, Fort Campbell made a local decision to grant 100 percent credit for TADS/PNVS and aircraft engine re-

Table 3.3

Turn-Ins at Fort Campbell and Fort Hood

	Fort Campbell	Fort Hood
Number of items returned	237,045	357,369
Percent serviceable	93%	80%
Percent consumable	93%	84%
Percent receiving 100% credit	28%	1%
Purchase price of items	$121,000,000	$160,000,000
Credit received	$87,000,000	$73,000,000

SOURCE: STARFIARS, Fort Campbell (October 1996–January 1997); Fort Hood (July 1996–October 1996).

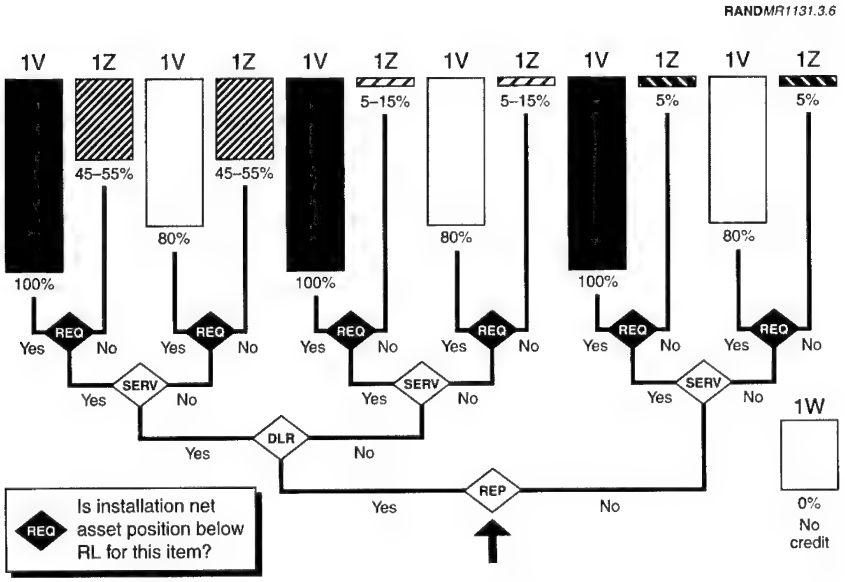
[8]In this respect, the Army differs from its sister services. For example, the Air Force WCF sells to customers at net price (i.e., standard price minus credit) unless the customer does not turn in a carcass within 60 days, at which time a penalty equal to the credit is charged.

turns.[9] Another reason for this difference is that during the period of the analysis, Fort Hood had an abundance of stock; because retail credits are based on the installation's net asset position (NAP), few returns at Fort Hood received 100 percent credit. The policy of basing credit for returns on the installation's NAP raises considerable uncertainty about the amount of credit a return will generate: when the return causes the number of assets to exceed the installation's retention limit for that particular NSN, the amount of credit drops dramatically.

The net asset position is a count of the number of items of each type in the installation's SARSS inventories, both OMA and AWCF funded. It is compared with the sum of the requisitioning objectives (the desired levels of inventory) plus the allowed retention quantities for that item at each inventory location to determine whether a returned item might be needed elsewhere on the installation. The rationale for giving a higher credit when the NAP is below the retention limit is that the RSF is very likely to be able to resell the item to another user on the installation. When the NAP is above the retention limit, the RSF is taking more risk that it will not be able to resell the item or return it to the wholesale source of supply for credit, so it gives less credit to retail customers. This credit variation shifts the risk that the item cannot be resold locally from the RSF to the retail customer.

In an effort to understand the source of units' uncertainty about the credit they would receive for returns, we worked with the Fort Campbell Combat Service Support Automation Management Office (CSSAMO) and installation financial managers to create the decision tree shown in Figure 3.6. This chart is drawn from a company's perspective, and it shows the factors that affect the credit received for an item. Begin at the arrow at the bottom of the flow chart. When a unit has an item to return, it knows if the item is a reparable (REP) or consumable. It also knows if the item is a DLR or FLR and if it is serviceable (SERV) or unserviceable. What the unit does not know is the

[9]For these items, a unit receives 100 percent credit from the RSF, and the item is repaired using OMA funds and returned to stock in the RSF. It is sold back to the unit for 100 percent—a wash to the RSF, except when an item cannot be fixed. In that case, the division comptroller charges the unit 42 percent, which is the net price the unit pays when an item is sent back to the depot and a replacement is purchased. This policy has recently been modified so that the expected cost of washouts is deducted from the credit rate.



NOTE: The codes at the top of the rectangles (1V, 1Z, and 1W) are called return advice codes. They indicate if the installation NAP is below the RL (1V) or above the RL (1Z) for the item being returned. 1W indicates that no credit will be granted.

Figure 3.6—Decision Tree of Army Retail Credit Policies

installation's NAP (shown as REQ on the figure)—that is, if the installation's NAP is below the retention limit (RL) for this item. As the figure shows, credit for returns to the RSF depends more on the installation's NAP than on the type of item (DLR, FLR, or consumable) or its condition (serviceable or unserviceable).

Note the difference between a "yes" or a "no" answer to the REQ question. For a serviceable non-DLR that is below the RL ("yes"), the credit is 100 percent, but if the installation is above the RL ("no"), the credit is only 5 to 15 percent. If the same asset is unserviceable, the item is repaired in the installation's RX or ISM program, and if the installation is below its RL, the credit is 80 percent. Thus, a broken item for which the installation is below its RL returns 65 to 75 percent more than a usable item for which the installation is above its RL. The same situation exists for nonreparable returns.

In general, DLRs garner more credit: 100 percent credit for serviceable DLR returns when the installation is below its RL and 45 to 55 percent credit when the installation is above its RL. However, DLRs are usually the most expensive category of stock, and such a large difference in credit has a big impact on the unit's budget (frequently, thousands of dollars). If the installation is above its RL, serviceable and unserviceable DLRs are granted the same credit.

An example of credit fluctuation is shown in Table 3.4 for the receiver transmitter on the AN/ASN-86 inertial navigation set. The price for a new receiver transmitter is $2,340. In October 1996, two transmitters were returned for full credit. However, on a single day at Fort Campbell in November 1996 (as shown by the shading), four transmitters were returned for full credit and one was returned for 52 percent credit. The unit that turned in the last transmitter received $1,123.20 less than expected based on the past credit rate, and it had no way of knowing in advance that the credit rate had dropped.[10]

Table 3.4

Credit Fluctuation on the AN/ASN-86 Inertial Navigation Set

Date	Quantity	Percent Credit
October 16, 1996	2	100
November 22, 1996	4	100
November 22, 1996	1	52
December 20, 1996	4	52
February 4, 1997	5	52

SOURCE: STARFIARS, Fort Campbell, October 1996–January 1997.

[10]Although one would expect a serviceable turn-in to have a higher value to the Army than an unserviceable turn-in of the same item, the data show that the average credit (as a percentage of the prices) given for unserviceable items at most Army installations (including Fort Campbell) exceeded that given for serviceable returns.

The average credit received depends more on the installation's NAP than on any other criterion. If "need" is an Army criterion for granting credit, then perhaps "need" should be established Army-wide and be published periodically, rather than allowed to change daily.

Value of Items Being Returned

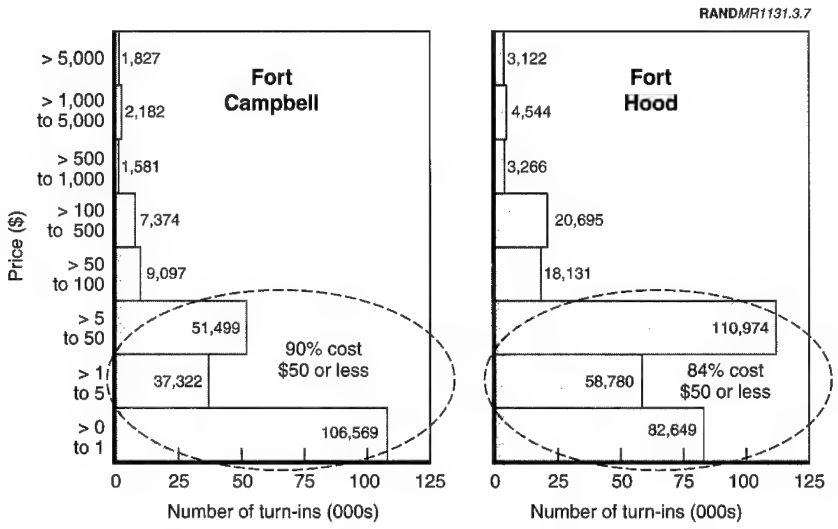
When reviewing the demographics of returns, we were surprised at the number of serviceable consumable items being returned. As Table 3.3 showed, of the 237,045 items Fort Campbell returned, 93 percent were serviceable and 93 percent were consumable, meaning that more than 200,000 serviceable consumables were returned in the four-month period of the data. If the same level of returns continued throughout the fiscal year, more than 600,000 serviceable consumables would have been returned to the RSF at Fort Campbell.[11] The average purchase price of these items was $15 each, and the average credit received from the supply system was $4. (The numbers at Fort Hood are similar: the average purchase price of serviceable consumables returned was $27, and the average credit was $5.)

Figure 3.7 shows the price distributions for serviceable consumable turn-ins at both Fort Campbell and Fort Hood. As the figure shows, some serviceable consumable turn-ins that received credit originally cost more than $5,000. However, the bulk of serviceable consumable returns had a purchase price of less than $50. At Fort Campbell, 90 percent of serviceable consumable turn-ins receiving credit cost less than $50; at Fort Hood, the statistic is 84 percent. Such statistics raise many questions about the labor, transportation, warehousing, and administrative cost of managing so many consumable turn-ins. The value of these items to the Army may be less than the value of the time spent on turning them in.

FINANCIAL WAIT TIME (FWT)

The discussions of the quality of price and credit information have shown that the company commander is uncertain about both price and credit information. As a result, the commander can never be certain how much money is left in the unit's account and may delay critical logistics processes until the uncertainty is resolved. The next logical question to address is how long the commander is uncertain: How long does it take a unit to see the effect of a supply transaction

[11]The numbers reported here exclude a small number of returns of condemned items and items in litigation.



SOURCE: STARFIARS, Fort Hood, July–October 1996; Fort Campbell, October 1996–January 1997.

Figure 3.7—Many Returns Receiving Credit Had Low Dollar Value

on its ledger? This period of uncertainty is called financial wait time (FWT).

FWT begins when a company initiates an order or turn-in transaction. It ends when the unit sees the final effect of that transaction on its ledger. Using the order and ship process as a case in point, since the final financial transactions do not occur until after the unit receives an item, FWT is the sum of customer wait time (CWT)[12] and financial processing time (FPT).[13] While the VG has established goals

[12]CWT is defined as the time from when a requisition is placed until the customer receives it, whether the requisition is satisfied locally or through the wholesale supply system. FWT includes CWT because the customer is not billed until the item is received.

[13]Elements of financial processing occur when the order is being processed and shipped, but at this stage in metric development, we are only calculating the additional time (beyond CWT) consumed by financial processes. For this analysis, FPT begins when an order is received and ends with the final debit or credit to the unit's account in the financial system.

for CWT, it has not yet established goals for reducing FPT. It is not desirable at this point for installations to attempt to measure and track FPT. Analysis of Logistics Intelligence File (LIF) data indicated that CWT is the major component of FWT. FPT does not add much additional time to FWT. Therefore, efforts are focused on reducing CWT.

Management reviews (recall the discussion of them in Chapter Two) are likely to have an impact on CWT. Requests can be held at the company for the commander's approval or at the division for financial approval. At the end of the fiscal year or when budgets are low, more requisitions are subjected to financial reviews. (For example, at Fort Campbell all requisitions for the 101st Airborne Division were reviewed in early December 1996 and again in March 1997 because division spending had exceeded planned spending.) These financial checks are in part a response to the uncertainty in the quality of price and credit information and can slow CWT.

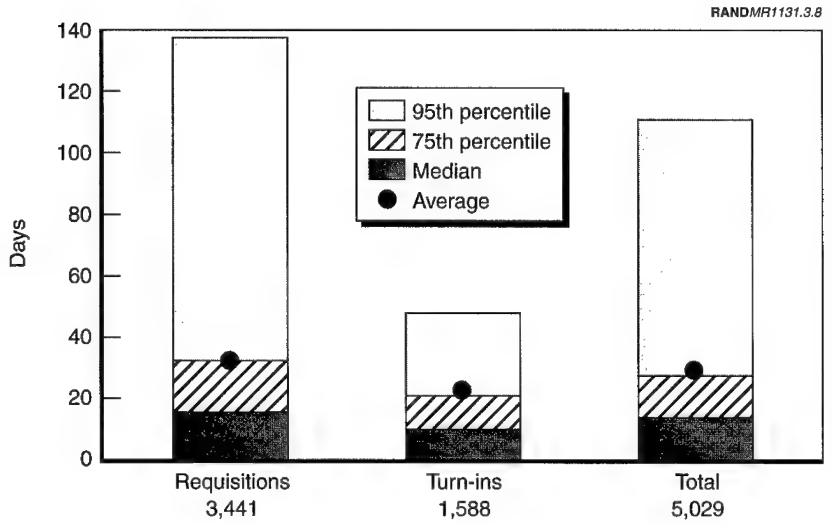
We analyzed FY96 dCAS data from Fort Campbell to measure FWT.[14] Figures 3.8 and 3.9 show total FWT for all types of transactions for two units.

Figure 3.8 shows FWT[15] for an aviation company at Fort Campbell (W34AE6). This unit was chosen for analysis because it had large numbers of both requisitions and turn-ins. For requisitions, the unit waited 33 days at the 75th percentile and 16 days at the median (50th percentile). The FWT was much shorter for turn-ins: 22 days at the 75th percentile and 11 days at the 50th. For requisitions and turn-ins combined, this unit waited 111 days at the 95th percentile and 14 days at the 50th percentile for the financial information to appear on the unit ledger. Such variability makes accurate tracking of ledger

[14]The Fort Campbell dCAS data have not been matched with LIF data. The dCAS data include all types of transactions, but we were not able to segment FWT into CWT and FPT.

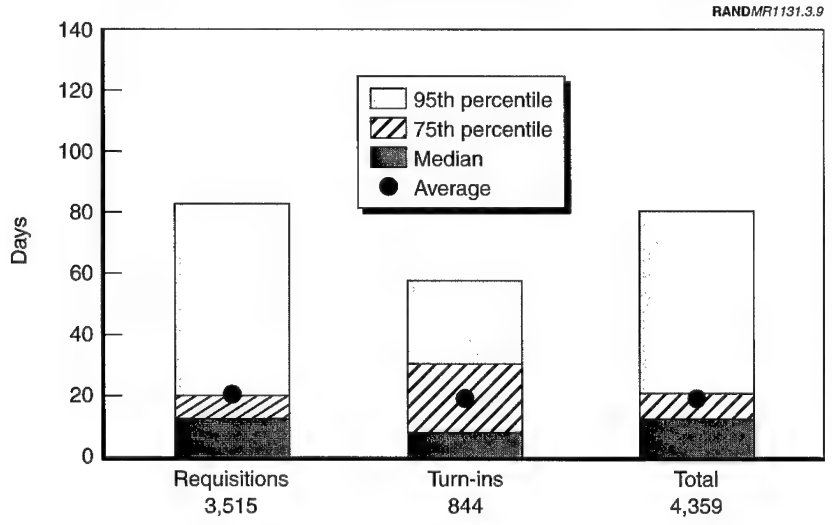
There are advantages and disadvantages to matching financial data with LIF data. The LIF data allow us to segment FWT into CWT and FPT, but they only include requisitions to the wholesale system. Thus, the matched data show CWT and FPT but do not include turn-ins or requisitions satisfied on the installation; in contrast, the unmatched data only show total FWT but include all transactions.

[15]We measured the time for each transaction from the date it was entered into the supply system (document number date) to the date of the last record in dCAS.



SOURCE: dCAS data, FY 96, backorders included.

Figure 3.8—FWT for Aviation Company at Fort Campbell



SOURCE: dCAS data, FY 96, backorders included.

Figure 3.9—FWT for DS Maintenance, B Company of 526th Forward Support Battalion at Fort Campbell

balances very difficult. The variance for turn-ins is far less than for requisitions because requisitions include backorders.

The data shown in Figure 3.9 come from an SSA, B Company of the 526th Forward Support Battalion (W34QV3). Again, this unit was chosen to illustrate the length of FWT because it had large numbers of both requisitions and turn-ins. For this unit, there was less variability in FWT at the 95th percentile, but turn-ins showed more variability in FWT than was seen for the aviation company on the previous figure.[16]

CONCLUSION

The metrics developed and analyzed by the FM PIT have helped to diagnose the causes of problems in the Army's logistics financial management processes and to identify areas for possible improvement, which we discuss in Chapter Four. Unfortunately, it is not currently possible to measure performance using existing data systems in some key areas, such as the amount of time and the cost of manual reconciliation efforts at the unit level. Metrics such as the quality of price and credit information are indirect indicators of these reconciliation efforts.

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[16]It should be noted that by the end of FY99, the CWT performance for requisitions at Fort Campbell had continued to improve: 8.7 days average, 6 days median, 7 days 75th percentile, and 13 days 95th percentile. Source: *http://www.cascom.lee.army.mil/vm/rand.htm*

This would imply that FWT at Fort Campbell has also declined, since CWT is a major component of FWT. We have no indication that FPT has declined, and there has been no initiative to target this portion of FWT.

Chapter Four

IMPROVING THE FINANCIAL MANAGEMENT PROCESS

Once the financial management process has been defined (Chapter Two) and measured (Chapter Three), the next step is to improve the process and monitor those continuing improvements through the measurements discussed previously. Unfortunately, the FM PIT found little that Fort Campbell could change on post that would relieve the burden of financial management or improve the financial information available to decisionmakers. Most of the financial management problems at Fort Campbell are the result of Army financial management policies—policies that a single installation like Fort Campbell cannot change. So rather than improve the unit financial management process that varies from installation to installation, the focus was on changes in Army policy that would obviate the need for reconciliation at the unit level.

The discussion in this chapter suggests policy changes the Army could make to improve the financial management process, working through the problems identified in Chapter Three and using examples from Fort Campbell to illustrate key points.

IMPROVING THE QUALITY OF PRICE INFORMATION

We recommend two policy changes that could help stabilize prices and reduce the amount of time that unit personnel spend on their manual financial reconciliation process.

Lock In Price at Time of Request to Improve Ordering Process

One of the problems uncovered in the D-M-I process is that prices for parts change throughout the year. The most direct way to stabilize prices would be to lock in the price at the time the request is placed. This price would then travel with the logistics and financial record, rather than being looked up in a catalog and reassigned each time a supply action occurred. This policy could be implemented by absorbing the price fluctuations at the MACOM level (through the stock fund). Based on the data analyzed in this research, the net of these many price fluctuations is relatively small.[1] Implementation would require changes to SARSS and to wholesale automated systems so that a new price is not assigned on each supply action. Alternatively, the wholesale source of supply could agree to bill the price effective in the catalog at the time the order was placed. In addition to automated system changes, this option would require coordination with non-Army sources of supply, such as DLA.

However, it also raises the question of which catalog would be used to assign the price at the time of the order. Under the current system, there can be discrepancies between the FEDLOG CD-ROM in the unit's local ULLS system, the Catalog Master File in the supporting SARSS-2AC, and the wholesale source of supply's catalog. Ideally, these systems should all be looking at one centralized catalog so they all see the same price at the same time.

Use Electronic Communications to Improve the Catalog Distribution Process

Mapping the catalog distribution process identified two areas for improvement: (1) potential problems with the comparability of the

[1]Most of the price discrepancies are for small amounts of money—$5 or less. Analysis using Fort Hood STARFIARS data (July to October 1996) showed that overall the percentage of requisitions that increased almost matched the percentage that decreased. Also, the dollar value transferred per requisition was close to zero—a net increase of 81 cents per requisition. These results varied somewhat by the source of supply, with Army-managed items having the highest percentage of increases. The net dollar value of the changes for Army-managed items was an increase of about $90,000. For the other sources of supply, the net monetary effect was negligible. Thus, it seems that a lot of financial turmoil is generated over a relatively small amount of money and the acceptable level of risk for the stock fund to absorb.

different versions of the catalog; and (2) the delay in distributing catalogs to Army unit-level supply activities.

Even though there may be "one version" of the catalog, if the unit-level automated supply systems (ULLS/SAMS) do not receive and install their catalogs by the effective date, logistics and financial managers will continue to have conflicting information and will need to rely on manual means to reconcile the reports of different automated systems.

Concerning different catalog versions, we found that the CTASC sites and the NICP item managers receive a completely new catalog each month. The CTASC site compares the current catalog and the new catalog, passing on only the changes to SARSS-2AC and SARSS-1. The ULLS and SAMS sites receive CD-ROMs with the entire catalog. Because of these differences in the catalog distribution process, the resulting catalogs may not always be the same. With most management information systems, relying on multiple copies of data results in problems with compatibility.

One way to address this problem is to change Army supply systems so that all access one centrally managed catalog. As of the writing of this document, the Army is developing a new logistics information system—the Global Combat Support System (GCSS)-Army[2]—that is supposed to provide this capability.

The lack of timeliness of catalog distribution to Army unit-level supply activities has several dimensions. The Army's input to the FEDLOG catalog is one source of delay. The Army had been mailing tapes rather than sending data by electronic communications to DLIS for input into FLIS. Using mail rather than electronic transfer adds time and variability to the process. In spring 1998, DLIS and the Army agreed that the Army would start transferring data to DLIS by using electronic communications, specifically file transfer protocol (FTP). Using FTP beginning in April 1998, DLIS was able to get the data to the contractor by the 9th of each month.

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[2]According to the Army Web site, GCSS-Army "is the worlds [sic] first truly integrated logistics support system encompassing the functions of supply, finance, transportation, maintenance, and personnel." See *http://www.cascom.army.mil/ automation/GCSS-Army_Global_Combat_Support_System-Army/Training/*.

DLIS and the contractor believe that FLIS could also transfer data by FTP directly to the contractor, with the goal of reducing the turnaround time required to send the data. However, DLIS believes that it is not a good practice because DLIS Headquarters staff needs to ensure all data files have been prepared correctly for transfer to the contractor.

The earlier the contractor receives the data, the sooner the CD-ROMs can be shipped to the ultimate customer. According to DLIS, the longest part of the contractor's process revolves around the packaging and mailing. (A total of over 40,000 individual packages are required.) All the packages are mailed first class and usually take anywhere from 1 to 10 days for delivery.

Sending CD-ROMs by U.S. mail and then distributing them through normal channels for distribution of other hard-copy products causes delays in catalog distribution. Even if the U.S. mail is timely, further delays arise in the receiving mailroom where incoming correspondence is sorted and distributed. When the CD-ROM arrives during field exercises, there is more delay before the CD-ROM is installed on the ULLS/SAMS system and little chance that it will be available by the effective date.

Clearly, more work must be done to improve the catalog distribution process so units receive catalogs by their effective date. The ultimate goal of the catalog process should be a single catalog that all systems access simultaneously. Until systems can be changed to meet this goal, better synchronization is needed in the existing process.

IMPROVING THE QUALITY OF CREDIT INFORMATION

Given the types of problems we have discovered, we recommend three actions to improve the quality of credit information.

Link Credit Rates to Army-wide NAP

As noted above, unserviceable returns may receive more credit on average than serviceable returns, because returns are linked to an installation's NAP instead of the overall needs of the Army. The quality of credit information available to units could be greatly improved by linking credit rates to Army NAP and then publishing

that credit rate in the catalog. If the amount of credit were known with certainty (as it would be if the credit were published in the catalog), units and divisions would find it easier to monitor and forecast their spending relative to budget. They would be better able to adjust stockage levels of items on ASLs and PLLs because they could calculate the credits they would receive for items no longer needed. In addition, they would have less incentive to delay turn-ins in the hope of receiving higher credit. Linking credit rates to the Army's NAP and then keeping the credit rate the same for a specified period would require changes in the way SARSS assigns codes to turn-ins and STARFIARS assigns credits based on these codes.[3]

If these same credit rates were extended to the wholesale level, changes to CCSS would also be required although CCSS already assigns NSN-by-NSN credit. It is possible that linking credits to Army-wide NAP could cause credit rates to change with each execution of the Requirements Determination and Execution System (RDES).[4] Currently at TACOM, RDES is run quarterly. As the D-M-I methodology is applied to this area, the Army should closely monitor the frequency of credit changes and their impact on the field as well as the AWCF.

Set Dollar Thresholds to Improve the Turn-in Process[5]

Another problem we discovered and discussed above is that the vast majority of turn-ins at Fort Campbell and Fort Hood were coded as serviceable consumables costing less than $50 and receiving correspondingly low credit. Thus, Army personnel may be spending a lot of time and effort returning relatively low-value items for a very low or perhaps negative return. If the Army set a dollar threshold for low-

[3]As part of the implementation of SSF, the Army will adopt a new credit policy that does not rely on installation-level NAP. See Brauner et al., *Evaluating Five Proposed Price and Credit Policies for the Army,* for a discussion of the proposed new credit policy.

[4]RDES produces a supply control study that calculates the wholesale requisitioning objective (RO) and the maximum retention level (RL) each time it is executed.

[5]The Army has a new draft policy that proposes to change regulations about what items can be retained at the unit level. In FY00, the Army began allowing retention levels on items under $50. The proposed policy would allow a retention level to be set on any item regardless of price.

value items to be retained for future use or discarded at lower levels (e.g., unit or SSA) rather than turned in to the supply system for credit, this workload could be reduced dramatically throughout the retrograde process. The reduced workload would allow personnel to focus on processing the return of the high-dollar items that account for the majority (80 to 90 percent) of the credit value. The Department of the Army or the MACOMs could set these dollar thresholds and a disposition policy. However, there may also be accountability issues to consider if the dollar value of disposals at the unit or SSA level increases.

The $50 cutoff is somewhat arbitrary. During the time this issue was being studied, the Army tried to calculate the cost of receiving, processing, transporting, and restocking a turn-in. The cost was estimated to be close to $50. All items with prices less than this cost should be retained for future use or discarded at lower levels. This cost should be calculated periodically and policy adjusted accordingly. Alternatively, the Army could charge a flat restocking fee per item returned. However, such a policy might not be in the Army's best interest, because units would pay the same restocking fee for a circuit card as they would for a tank engine.

Use NSN-by-NSN Credit Rates and Reconsider an Exchange Pricing System

Currently, the credit an OMA-funded logistics customer receives from the RSF for the return of an item depends on the condition of the item (serviceable or unserviceable),[6] average repair and replacement costs by MATCAT (materiel category) and whether the item is needed elsewhere on the installation.[7] Previous RAND Arroyo Center research has indicated that the Army's practice of using average repair and replacement costs by MATCAT to calculate credit rates can cause installations to make repair decisions that are not

[6]A serviceable item is in working condition and can be issued to another customer. An unserviceable item must be repaired before it can be returned to inventory.

[7]Technically, the credit is determined by the net asset position (NAP) of the item, as recorded in SARSS by RIC-GEO (Routing Identifier Code-Geographical Area), but most installations have only one RIC-GEO. If the NAP (the number of items of that type in inventory) is below the retention limit, the customer receives a much higher credit than if the NAP is above the retention limit.

cost-effective from an Army-wide perspective.[8] As a result of such averaging, installations may sometimes repair items when their costs are higher than wholesale repair costs, or return items for wholesale repair when installation repair costs are actually lower. The Army's practice of giving very low credit for FLRs and consumables that are not needed locally makes it difficult for logistics customers to adjust local stockage levels to reflect changes in demand rates and creates incentives for customers to redistribute these items outside normal supply channels, by setting up OMA-funded retention activities, for example.

These problems can be avoided by setting credits on an NSN-by-NSN basis to reflect the actual costs to the supply system of transporting and restocking a serviceable return or of repairing, transporting, and restocking an unserviceable return. When credit rates reflect actual costs, logistics customers will have a financial incentive to repair or redistribute an item only if it is cost-effective from an Army perspective. Customers should also find it less expensive to adjust stockage levels if credits for serviceable returns are set at the purchase price minus transportation and restocking costs.

An "exchange pricing" system can combine the benefits of linking credit to Army-wide need (NAP) and NSN-by-NSN credit. Under exchange pricing, units pay only the difference between the price of a new DLR and the credit received on a carcass. If they fail to return a carcass during a fixed period of time after the new item is received (60 days, for example), they are charged a "carcass price" that is equivalent to reversing out the credit. They also receive the carcass price if they return an unmatched unserviceable DLR. Since the exchange price does not depend on installation NAP and is set on an NSN-by-NSN basis, it incorporates credit based on Army-wide need and NSN-by-NSN credit based on wholesale repair costs. In addition, it reduces the initial outlay of OMA funds for DLRs, so that units do not have to wait for credits to show up in their OMA accounts. The Army has mandated a policy of providing credits on an NSN-by-NSN basis, effective October 1, 2000. The Army will be implementing

[8]See Brauner et al., *ISM-X Evaluation and Policy Implications*, Santa Monica, CA: RAND, MR-829-A, 1997.

this policy to coincide with milestone 2 of its Single Stock Fund effort.

Both the Navy and the Air Force currently use exchange pricing for their DLRs. Exchange pricing is current OSD policy.[9] The Army annually requests a waiver from this OSD policy. The primary concern of the Army is that it lacks a system for tracking carcasses that would allow it to penalize units that fail to return carcasses within the allotted time. However, the Army is currently making efforts to add the capability to track unmatched recoverables to new automated systems, such as ILAP. This capability could be used to help implement an exchange price system.

Exchange prices (or NSN-by-NSN credit rates for serviceables and unserviceables) could be implemented by adding them to the AMDF catalog. SARSS would have to be modified to look up NSN-by-NSN exchange prices or credit rates in the AMDF.[10] Currently, STARFIARS looks up the percentages by MATCAT in the Standard Army Intermediate Level Supply System (SAILS) credit table, based on a return advice code assigned by SARSS.[11]

IMPROVING FWT

We recommend two actions to improve FWT.

Set Dollar Parameters to Improve Ordering Process

One source of financial delays in the requisition process, and thus of increased FWT, is the high-dollar review at the SARSS-2AD level. The

[9]"For the issue of a reparable item in which the requisitioner indicates a carcass will be returned, the customer will be charged the exchange price, i.e., the established repair cost plus the appropriate cost recovery elements. . . . The exchange price shall be established before the beginning of each fiscal year for each homogeneous group and provided to customers and shall remain constant throughout the execution fiscal year." *DoD Financial Management Regulation,* DoD 7000.14-R, Vol. 11B, p. 55-28.

[10]When SSF has been implemented, the dollar value of credit for serviceable and unserviceable returns will be in the AMDF catalog, and SARSS will have been modified to look up the NSN-by-NSN credit in the AMDF. This phase of SSF is currently scheduled to be implemented in FY01.

[11]Although most of SAILS has gone out of use at installations with SARSS, it still provides a look-up table of alternate credit rates.

value in the dollar edit parameters (discussed previously) is based on the type of equipment and mission being supported. Units that support very expensive equipment should set proportionately higher thresholds. (The dollar limits can be adjusted in SARSS, but not in ULLS, where another high-dollar review occurs.) The new values would allow for the review of very-high-dollar items, while allowing most requisitions to be processed without delay.

Use Financial Management Tools to Improve Reconciliation Process

Process walkthroughs and discussions with unit-level "financial management" personnel indicated that few people at the unit level were satisfied with the tools available to them to reconcile logistics system data with financial management data. At Fort Campbell, units received products from TUFMIS, dCAS, and STANFINS. There seemed to be a consensus that STANFINS and dCAS provided the most complete data; however, they are difficult for the unit-level personnel to understand and do not provide much of the information essential at their level. TUFMIS provides the information in an easy-to-understand format that is also easy to match against the unit's supply document register, but it does not include information for charges other than supplies. With TUFMIS, units can manage their funds by class of supply, which is helpful because they construct their budgets by class of supply.

The ILAP/LOGFIN module is designed to help units reconcile logistics and financial information at the division level. To assist Fort Campbell in its VM implementation effort for financial management, the FM PIT arranged for the ILAP program manager to provide on-site assistance to set up ILAP. The commander of the 101st Airborne Division also funded a full-time ILAP administrator. The administrator now runs ILAP and ensures that data are loaded in a timely manner. The accuracy and availability of ILAP have improved.

Nevertheless, customers remained reluctant to use ILAP. TUFMIS is still the system of choice at Fort Campbell and remains the official unit-level financial management system for reconciling supply system data with financial management system data. Financial managers are using information provided by dCAS for reconciling other

information, e.g., credit card purchases, local purchases, travel expenses, etc. Customers at the division level and above should be able to make better use of ILAP. And once the foregoing improvements have been made to the quality of price and credit information and the catalog distribution process, the necessity for time-consuming reconciliation below the division level will be greatly reduced if not eliminated.[12]

CONCLUSION

The Army is currently in the process of implementing some of the recommendations of the FM PIT, while others remain under consideration. As part of the initial implementation of the Single Stock Fund initiative in FY01, which will combine the operations of the current RSF and WSF, the Army will introduce a new credit policy that eliminates dependence on the installation's NAP and sets unserviceable credits based on NSN-by-NSN repair costs. This policy should make credits more predictable and give logistics customers better financial information about the relative costs of repair at the wholesale and local levels. The FM PIT has been tasked to identify the policy and automated systems changes that will be needed to lock in prices at the time of request.

Table 4.1 summarizes the progress made on each of the recommendations to improve logistics financial management processes. As indicated, there is much that still must be done before the Army can have a financial management process that supports the warfighter and facilitates the optimal use of resources.

When process improvements have been implemented, the Army must revisit the metrics described in Chapter Three to verify whether the expected changes have occurred and repeat the D-M-I methodology to identify additional areas for improvement. There are also other logistics financial management processes for the FM PIT to

[12]A fundamental question for many is whether ILAP deploys with units or is just a peacetime/garrison tool. The answer is that some units currently take ILAP into the field during exercises, but currently ILAP must be tied into a local area network (LAN) in order to receive all the data feeds required to keep information up to date. The issue of how to maintain the data feeds during deployment must be addressed before ILAP can be considered a deployable tool.

address, including the Army's wholesale supply management and depot maintenance financial management processes.

Many of the foregoing recommendations can be summarized in a basic principle that the Army should adopt: **Prices and credits in place when a transaction is first undertaken should be the prices and credits used for the transaction.**

Table 4.1

Status of Progress on Recommendations to Improve Logistics Financial Management Processes

Improvement Recommendation	Army Implemented	Implementation in Progress	No Action
Lock in price and credit at time of request			No action; FM PIT tasked to identify policy and systems changes
Use electronic communications (i.e., Web-based) for catalog distribution		May be under consideration for GCSS-Army	
Link credit rates to Army-wide NAP		Planned for SSF	
Set dollar thresholds to improve turn-ins process	Implemented in FY00		
Use NSN-by-NSN credit rates and reconsider an exchange pricing system		NSN-by-NSN credit rates planned for SSF	No action on exchange pricing; Army continues to ask DoD for waiver
Set dollar parameters to improve ordering process	Parameters changed in some SARSS boxes		Must allow for changing parameter values in ULLS
Use financial management tools to improve reconciliation process	Many division-level organizations use ILAP	Unit checkbook planned for GCSS-Army	

FUTURE INVESTIGATION

The Army and DoD are in the process of building a new wholesale supply management system (GCSS-Army) and a new financial management system (Defense Joint Accounting System (DJAS)). To compare the Army's proposed systems with the private sector, we discussed commercial logistics financial management systems in interviews with representatives of Manugistics, SAP, and Microsoft.

The Microsoft financial management system was particularly interesting because Microsoft—a leading software developer—did not develop its own system. Microsoft partnered with SAP to build a new financial system. Microsoft's system operates worldwide in many different currencies. The complete integrated system at Microsoft is composed of three parts: (1) order entry, (2) transaction recording, and (3) reports/analysis. Separate systems perform these functions.[13] Microsoft uses one system (SAP R/3) for transaction recording, many diverse systems for order entry, and one combined system for analysis and reporting: a combination of commercially available products, primarily from Microsoft, and internally developed software. The systems are linked tightly in that only one record of each transaction proliferates through the systems. The records are maintained in one database that is accessed by all users. In contrast, the Army's systems create multiple copies of each transaction, generating discrepancies and the need for reconciliation.

As the Army and DoD move forward to modernize their legacy systems, they would do well to look to the leaders in industry for examples of successes and failures. The young soldier of today is accustomed to ordering books, music, computers, etc. quickly over the Internet.[14] Up-to-the-minute financial information is available with the click of a mouse or the punch of a phone button. Stocks and bonds are traded electronically. The gap between corporate Ameri-

[13]Comparing Microsoft's system with the Army's current system, we see that Microsoft's order entry system is the equivalent of the Army's SARSS, its transaction recording system is the equivalent of STANFINS, STARFIARS, AFMIS, IFSMIS, TAMMIS, SAACONS, etc., and its report-generating system is the equivalent of dCAS and TUFMIS.

[14]Before the Army invests in Web-based technology, it must ensure appropriate communication channels are available. Currently, many tactical units cannot even get a phone or radio. They must at a minimum have Internet connectivity.

ca's automation and the Army's is widening daily. The Army should move rapidly to commercial products that would revitalize its current logistics financial management systems.[15] As Nathan Myhrvold[16] of Microsoft noted,

> gains in efficiencies will not be from people becoming smarter or more intelligent, but will come through the leverage and use of technology.

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[15]The U.S. General Accounting Office has a report that evaluates the development and maintenance of software for information systems owned by DFAS. See *Defense Financial Management Immature Software Development Processes at Indianapolis Increase Risk,* GAO/AIMD-97-41.

[16]Personal communication. We learned about Microsoft's implementation of a new financial management system from the book *Safety Nets: Secrets of Effective Information Technology Controls,* by Bashein, Markus, and Finley (1997). We recommend the book as a discussion of how five companies (American Standard, BankAmerica, Microsoft, Norrell, and USAA) implemented new information technology: problems, best practices, and different solutions.

Appendix A

VELOCITY MANAGEMENT

Velocity Management (VM) is an Army initiative to dramatically improve the performance of logistics processes (e.g., order and ship, repair, stockage determination, and financial management). VM was initiated in January 1995 by the Army's logistics "Triad"—the Deputy Chief of Staff for Logistics (DCSLOG), the Deputy Commanding General of Army Materiel Command (DCG AMC), and the Commanding General of Combined Arms Support Command (CG CASCOM). The CG CASCOM serves as the Executive Agent for implementation.[1,2] In this appendix, we briefly discuss what VM is; then, we look at the D-M-I components of the process.

WHAT IS VM?

VM is a management program aimed at improving the Army's logistics processes, both in garrison and when deployed. Initially, the Army conducted a pilot implementation of VM at a few locations, but it is now implementing VM Army-wide. VM targets every segment of every logistics process with the goal of getting logistics support to the

[1]The Army has an extensive Web site devoted to Velocity Management: *http://www.cascom.lee.army.mil/vm/*. This site has many reports on VM metrics and progress in achieving goals.

[2]Recognizing the Army's success in achieving dramatically improved performance in logistics processes, the Marine Corps has adopted the VM approach, which it terms "Precision Logistics." Readers interested in comparing the Precision Logistics initiative to VM should seek out M. L. Robbins et al., *Measurement of USMC Logistics Processes: Creating a Baseline to Support Precision Logistics Processes*, Santa Monica, CA: RAND, DB-235-USMC, 1998. The Marine Corps Web site for Precision Logistics can be found at *http://www.hqmc.usmc.mil/ilweb.nsf*.

soldier when it is needed. It works by finding and eliminating the sources of delay and undependability in the various processes. It requires logisticians to measure their performance carefully so they can better support their customers and ultimately the field commanders.

This program makes a major change in how the Army does its logistics business. Traditionally, the logistics system has been thought of by function, e.g., ordnance, transportation, and quartermaster. Some have described these functional lines as "stovepipes" because they focus only on a narrow set of activities. The problem with functional management is that it is hard to address problems that cross functional boundaries. By contrast, VM looks at logistics by process (e.g., the processes of ordering and receiving a spare part or repairing a piece of equipment). Processes cut across functions. VM can be thought of as managing logistics by process, with an emphasis on streamlining the processes to improve their "velocity." In addition to reducing the time it takes to perform basic processes, VM is also concerned with improving quality and lowering costs. Many changes to streamline processes also improve quality and save money.

VM has the support of the Army leadership. A coalition of more than two dozen senior logisticians headed by the DCSLOG oversees it, and this coalition is called the Velocity Group (VG).[3] The VG is implementing VM across the Army by using two different types of teams. One type of team is called a Process Improvement Team (PIT). It focuses on processes that cut across Army installations and organizations (and joint providers like the DLA) such as the order-and-ship process. Currently, there are five PITs: Order and Ship, Repair, Stockage, Financial Management, and Transportation. Another type of team, called a Site Improvement Team (SIT), focuses on logistics processes at a single location, such as an installation or repair depot. This two-tiered organization is designed to implement VM as rapidly as possible by improving processes at and across installations simultaneously.

[3]This coalition has been one of the key factors in the success of the logistics process improvements achieved through the VM initiative. It is notable that the coalition has not had strong support from the Army's financial community, and few of the recommendations from the VM FM PIT have been acted upon.

HOW DOES THE VM D-M-I PROCESS WORK?[4]

Conceptually, the VM approach to improving the performance of logistics processes involves three steps: (1) define the process you want to improve, (2) measure the process performance, and (3) improve the process. Although simple in concept, each of these steps can be difficult in practice. For the definition step, each process has to be broken down into subprocesses and activities. Then, the performance of the process has to be measured in terms of time, quality, and cost, which might require developing measurement standards and data sources. Identifying feasible and affordable ways to improve the process can pose its own set of challenges. Here, we briefly describe the three process components.

Step 1: Defining the Process

The first step in defining a process is to determine who the customers are and what outputs (products, services, information) they want, what inputs are needed to produce these outputs, and how the inputs are transformed into the outputs. Defining a process at a useful level of detail usually requires the PIT to undertake a "walkthrough" of the process under review. During the walkthrough, it is common for participants to gain new knowledge about and new perspectives on each step and activity in the process. It is especially enlightening to see how policy is translated into practice, how local standard operating procedures (SOPs) vary and with what effect, and how individuals who perform various steps in the process view each other's performance.

The outputs of a process can be parts, forms, or other materiel or information. For each output, the PIT must identify the customer. The identity of customers becomes important later as the PIT works with customers to establish improvement goals (e.g., quality measures). A key goal for improving the Army logistics system is better support to the customer. The ultimate customers of the system are

[4]This subsection draws heavily on unpublished RAND Arroyo Center research by John Folkeson, Rick Eden, John Dumond, and Jerry Sollinger entitled "Velocity Management Implementation Guide." For more details on specific process improvments, refer to the works in the bibliography by Dumond, Eden, and Folkeson (1995), Edwards and Eden (1999), Girardini et al. (1996), and Wang (2000).

the commanders and the soldiers in the field. However, the internal customers of each process and segment must be satisfied if the ultimate customers are to be served.

Next, the PIT identifies the inputs to the process. It can be difficult to identify all the inputs to a process. Inputs can be materiel, information, money, or something else. For example, a prescribed load list (PLL) clerk processing a requisition using the Unit-Level Logistics System (ULLS) requires input from a mechanic such as forms and signatures. The providers of each input also need to be identified, e.g., mechanic, motor sergeant, battalion maintenance officer (BMO).

As inputs, outputs, providers, and customers are identified, typically the logistics process at hand begins to look exceedingly complex. Frequently, it becomes evident that the roles of customer and provider and the relationships among the organizations that play these roles may not be straightforward. The customer of an output may also be the provider of some inputs. For instance, the mechanic who wants a part is both provider (the order to the PLL clerk) and customer (the person who finally receives the part). One of the goals of this step of the implementation is to track and recognize these relationships. Any of them may be the source of a problem that is hindering the performance of the process as a whole. A good indicator of an opportunity for process improvement arises if the PIT cannot identify a customer for a subprocess or an output. If an output has no customer, it may be unnecessary.

The final task of the definition step is to map the process that turns inputs into the desired outputs. This step can be difficult to get started and can become unmanageable because of complex interactions. The process map helps the PIT to visualize the process and promotes shared understanding during team discussions and problem solving.

Step 2: Measuring the Process

After a process has been defined, the next step for the improvement team is to measure how well the process is currently working. The VG has identified three dimensions of process performance to measure: time, quality, and cost. Measuring the process includes deter-

mining how to measure performance (i.e., "what is goodness"), establishing the baseline performance level for each dimension, and setting goals for improvement. Figure A.1 illustrates some of the tasks necessary for initially measuring a process. The remainder of this section discusses the process shown in the figure in more detail.

Defining metrics. To measure a process, the PIT must identify or develop metrics for each dimension of performance. For instance, metrics of time for the repair process might include total repair cycle time (from the time the item is determined to be broken to the time when it is repaired and available for use). A metric of quality for the order process might be the number of rejected requisitions.

Time is probably the most straightforward dimension of performance to measure for many processes. However, it is important for the PIT to develop a consensus on the definition of the process before it develops metrics. When does the process actually start? When does it end? The time measurement should be continuous; that is, the ending point of one segment becomes the starting point of the next. The PIT must communicate with providers and customers to make sure that there are no gaps where responsibility has not been explicitly assigned. All of the time needed to complete a process must be accounted for, and someone should be responsible for reducing it. In particular, someone must be accountable for reducing the time that needed information or materiel simply waits to be moved or processed.

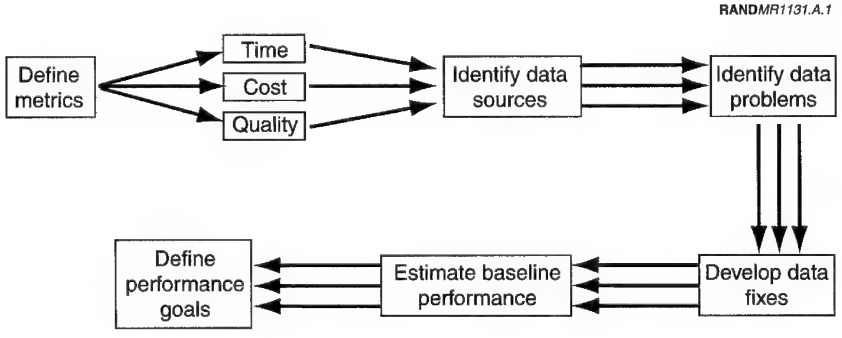

Figure A.1—Initial Tasks in Measuring a Process

Quality metrics are more difficult to develop because, unlike time metrics, they must be defined in terms of the specific output. Customer needs and value judgments drive the definition of quality. High quality means one thing for a repair, and another thing for a shipment. Which characteristics of the process output does the customer value most? How well do customers think the process is performing? What is the quality of the inputs to the process?

Cost can be difficult to measure because current military accounting systems have been set up to track expenditures by congressional appropriation category rather than by traditional cost accounting or activity-based accounting approaches. The current system is designed to ensure that funds are spent for the reasons Congress appropriated them, not to measure costs and relate them to performance.

To evaluate process performance, however, it is important to identify the true comparative cost to the Army. The goal should be to evaluate improvement proposals and track performance over time using true comparative costs, the total cost to the Army. The appropriation category of the funds spent is relevant, but a process may require funds from many different categories. For example, the pay of civilian workers and military personnel comes from different appropriations, but in tasks where they are interchangeable, both types of costs are relevant in determining the total cost to the Army to provide the product or service. The accurate costing of resources is a difficult issue, because different types of costs may be recorded in different automated systems or databases.

Metrics should be selected that provide insight into the variability of performance, as well as the average performance of a process, because one goal of process improvement efforts will be to reduce such variability. For instance, in measuring order-and-ship time (OST), the Order and Ship PIT moved away from the traditional metric of average or mean OST to a set of metrics. Instead of simply using the "mean," they measured the 50th (median), 75th, and 95th percentiles of OST. These metrics permitted them to focus on improving not only the speed but also the dependability of the order-and-ship processes.

Determining the availability and adequacy of data. Once a process metric has been defined, the next step is to determine whether adequate data are available to measure it. This means identifying specific data sources; if more than one data source is available or will be needed, it will be necessary to consider how data from each will be reconciled or combined.

Identifying data problems and solutions. In some cases, the measurement data will not be available or some data will be of poor quality. For instance, the PIT may be interested in the performance of a segment that is not currently measured, such as the time from when a fault is first observed by the operator of a weapon system to when it is first reported.

The PIT must identify such data problems and eventually develop a solution for each. Solutions can vary widely in acceptability. In some cases, both a short-term and a longer-term solution may be needed. For instance, the PIT might have to set up a team to review and correct data by correcting mistakes, filling in missing entries, and so forth. For the longer term, the PIT would want to fix the data-entry problem by educating users or by making the data-entry process more user friendly or foolproof. The PIT may want to identify additional data-collection points for future modifications of the appropriate Army information systems.

It is essential that the PIT quickly establish some method, even if imperfect, for measuring the performance of the process on each process metric—time, quality, and cost. If data are not identified and a regimen for analysis is not developed, it will not be possible to accomplish the next step, improving the process.

Estimating baseline performance on each dimension. Establishing the current (baseline) performance of each process is an important early task. The baseline dataset should cover a long-enough period of time—for most processes, a year suffices—to display seasonal and other recurrent variations in performance levels. This baseline provides a basis for two important comparisons. The first is a comparison against the goals for the performance of the process. For example, the Army set a 7- to 10-day maximum goal for OST (for active units' requisitions from CONUS to the wholesale supply system) against the baseline of over 25 days on average. Where the goals and

the baseline performance do not differ, either no improvement is needed or the goals need to be revisited. With continuous improvement, goals should become more challenging as progress is achieved. The second comparison is one of baseline performance against performance of the process once changes have been introduced. As time passes, it should be possible to document a trend of continuing improvement through the implementation of initiatives. That is, performance should become continuously cheaper, better, and faster.

Establishing goals for improvement. For each process and on each metric, it is important to decide what level of performance is desired and to set challenging but achievable goals. Goal setting requires information from several sources. One source is the customer(s) of the process. However, customers may not be the best judges of what they want if they do not have a good understanding of what is possible. Another source of information is benchmarking, i.e., determining the level of performance that other organizations, including commercial ones, are achieving in similar or comparable activities. Can a HMMWV be repaired on post as fast as a car is repaired off post? Benchmarking focuses on organizations considered high performers that reflect the state of the art in what is technically feasible. It is not necessary to go to the commercial sector for a benchmark; the best performance of the process at another Army organization can be used as a benchmark. For example, a neighboring unit that consistently gets all its Class IX requisitions off post in less than six hours can be a benchmark for other units on an installation.

Where current baseline performance is determined not to meet the goals for improvement, the PIT proceeds to the third step, improving the process.

Step 3: Improving the Process

Almost everyone who is working in a process or who is the customer for a process can suggest improvements to that process based upon his or her individual experiences. The structured approach presented here is intended to help think systematically about how to develop, implement, and monitor suggestions for change. Often, "improvements" are implemented when there are little or no performance metrics in place, and it is impossible to determine whether

they achieve their intended goals. Both functional expertise and creativity are needed to develop improvement proposals. Leadership at all levels is required to implement a proposed change successfully.

Target improvement efforts. Having defined a logistics process and established the baseline performance measurement, the PIT can now begin to analyze the process and determine where improvement efforts should focus. There are several strategies to consider at this stage of the improvement process. First, the PIT can look for "low-hanging fruit"—that is, obvious opportunities for improvement that can be achieved easily and quickly. These may be activities that can simply be eliminated (e.g., repetitive approvals) or procedures that can be adjusted with great effect (e.g., synchronizing batching of computer runs or ensuring that parts requests get entered or delivered so they get into the wholesale system as soon as possible).

Second, in attempting to maximize the leverage of early efforts, the PIT should focus on the segments with the "largest" potential savings first. Largest can be defined along any metric—i.e., time, cost, or quality. If significant improvement can be achieved in these large segments, the process as a whole will be affected in evident ways. These lucrative targets are usually exposed during the previous steps.

Third, the PIT can consider focusing on improving the quality of inputs to the process. This is likely to be a fruitful strategy if the early segments of the process seem to be the most problematic. For instance, a local repair process may run smoothly once truly broken parts have been identified, but technicians may be spending a lot of time determining which parts turned in for repair are not actually broken. This type of process improvement usually requires SIT members to work with input providers.

Develop alternative solutions. For each of the targeted segments, the PIT should propose one or more alternative solutions it believes would outperform the current design. Alternatively, if the process seems hopelessly complex in its design or if most rather than some segments show problems, the PIT should consider redesigning the end-to-end process from scratch. Again, the PIT should produce one or more alternatives that it believes will outperform the current design. It is important for the SITs to coordinate their activities with the appropriate PIT when implementing local process improvements

so as not to waste effort on alternative designs that have already been discussed and accepted or tested and rejected elsewhere.

Implement alternatives. Once a preferred alternative has been identified, it must be implemented across installations. Both PITs and SITs should be prepared to help in that implementation. Ideally, the SIT will be able to implement most of the changes with the support of their local leadership. However, where implementation is beyond the ability of a SIT, then the PIT or the Army's change agents can assist installation personnel.

Monitor and report improvements. Once the change has been implemented, the process needs to be measured so that improvements can be documented and tracked. Performance measurement is the prerequisite to the next round of continuous process improvement. Organizations that have worked through this improvement cycle a few times have consistently reported dramatic cumulative results and have come to recognize the critical importance of measurement to their efforts.

Appendix B

THE BENEFITS OF STOCK FUNDING

The purpose of working capital funding is to create financial incentives to reduce support costs while maintaining readiness. During the FM PIT's process walks, however, members often heard a longing for the days before DLRs were stock funded. This appendix documents some of the benefits the Army has realized under stock funding of DLRs. Briefly, logistics customers have responded by reducing demands for DLRs, increasing return rates relative to demands, and seeking alternative sources of supply and repair.[1]

From the provider perspective, working capital funding has resulted in significant reductions in costs and civilian personnel. From fiscal year 1993 to fiscal year 1999, the logistics infrastructure costs of all DWCF activities—including the Defense Logistics Agency (DLA), DFAS, etc.—fell from $53.6 billion to $44.2 billion, a 30 percent reduction after accounting for inflation. Civilian personnel in DWCF activities fell from 290,000 to 184,000 over the same period, a 37 percent reduction. As part of these total personnel reductions, supply management personnel have been reduced by 39 percent and depot maintenance personnel have been reduced by 43 percent.[2]

Evidence of declining demands for reparables since 1992 can be seen in the Army's Operating and Support Management Information Sys-

[1]See Brauner et al., *ISM-X Evaluation and Policy Implications,* for a discussion of alternative sources of supply and repair.

[2]Office of the Under Secretary of Defense (Comptroller), *A Plan to Improve the Management and Performance of the Department of Defense Working Capital Funds,* September 1997, pp. 18–19.

tem (OSMIS), which contains cost data on all the Army's major weapon systems. Analysis of these data for the Apache and Blackhawk helicopters, the M1 tank, and the Bradley Fighting Vehicle shows that since 1992, purchases from wholesale of Class IX reparable parts have declined both on a per-system basis (Figure B.1) and a per-flying-hour or per-vehicle-mile basis (Figure B.2).[3]

In Figure B.1, the left axis shows purchases from the wholesale system per helicopter (Apache or Blackhawk). Note that in 1992, purchases of Class IX reparable parts per Apache were approximately $751,000 and by 1998 they were down to $472,000. The Blackhawk did not see as dramatic a decline in purchases per system, but the cost of Blackhawk reparable parts per helicopter is also considerably less than for the Apache. In 1998, purchases of Blackhawk reparable

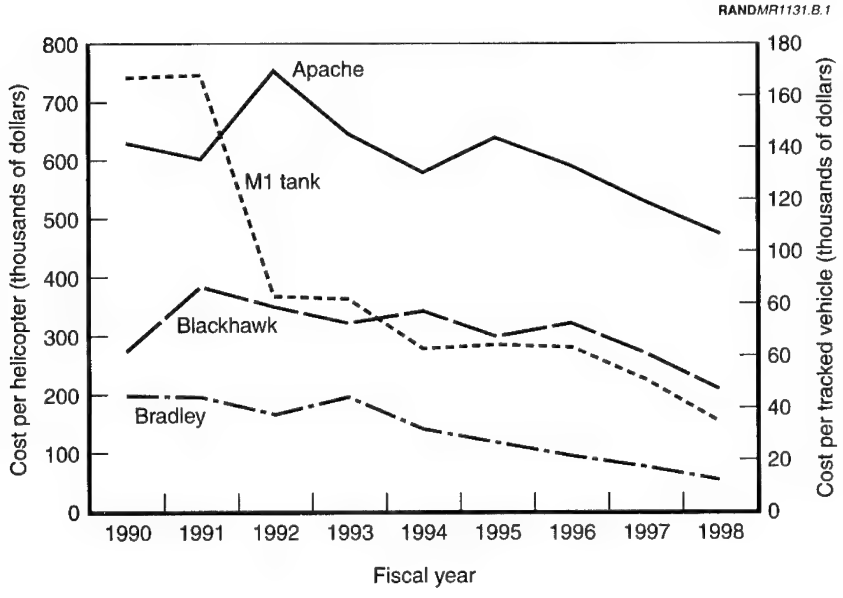

Figure B.1—Purchases of Class IX Reparables per System

[3]There were no other trends in the data, such as changes in flying hours per helicopter or miles per vehicle, that seemed likely to account for the reduction in demands for Class IX reparables.

parts were just over $200,000. Tracked vehicles in general require less-expensive Class IX reparable parts; thus, purchases per system should be lower, as Figure B.1 confirms. The right axis in Figure B.1 shows the cost per tracked vehicle (here, the M1 and Bradley). From 1992 to 1998, purchases of reparable parts per vehicle for the M1 tank declined from $82,000 to $35,000; those for the Bradley declined from $38,000 to $13,000.

These trends for both helicopters and tracked vehicles are confirmed by Figure B.2. The left axis in the figure shows purchases of Class IX reparable parts per flying hour for the Apache and Blackhawk helicopters. In 1992, purchases of Apache Class IX parts amounted to over $5,000 per flying hour; by 1998, they had declined to $2,900. Over the same period, Blackhawk reparable costs per flying hour declined from $2,200 to $1,200. Similarly, the right axis in Figure B.2 shows purchases of Class IX reparable parts per vehicle mile for the M1 tank and the Bradley. Purchases of reparable parts for the M1 declined from $135 per vehicle mile to $93; for the Bradley, they declined from $45 to $29 over the same six years.

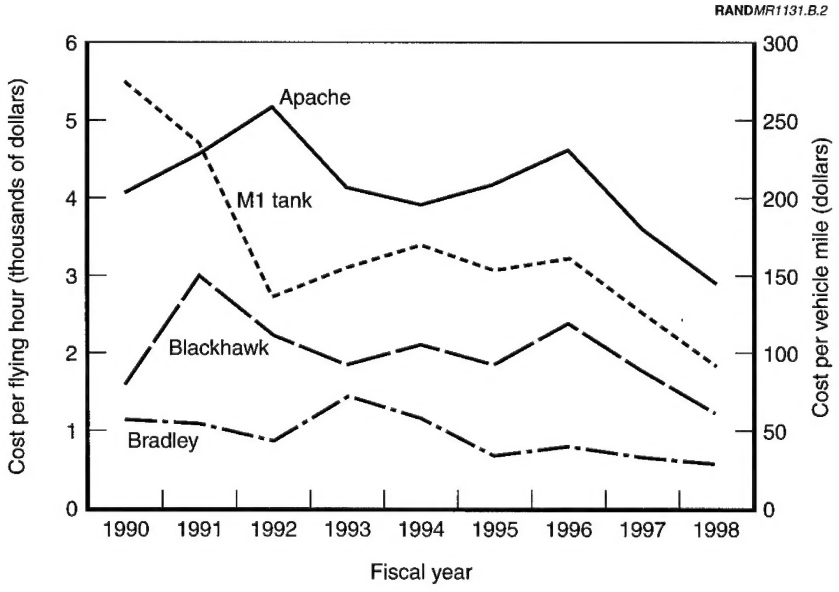

Figure B.2—Purchases of Class IX Reparables per Flying Hour/Vehicle Mile

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